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ABSTRACT

The report evaluates the Expanded Food and Nutrition Education Program (EFNEP) in Missouri by comparing the dietary adequacy and nutrition knowledge of 200 program families representative of urban, small town and rural areas with that of 200 similarly representative non-program families. Data were gathered by personal interviews taken in March, 1972, employing the 24-hour recall questionnaire method. The tabular presentation of data states that: program families' dietary adequacy was not consistently better than that of control families; both program and control groups' nutritional adequacy was comparable; program families' nutrition knowledge was higher than that of control families; nutritional adequacy depended most on educational level; median percent recommended dietary allowance and nutrition adequacy did not depend upon tenure in the program; and food buying and nutrition knowledge increased with more frequent visits of program workers. The study concludes that the EFNEP has been successful in its efforts, especially during the first 18 months of a family's participation, but it questions whether the data indicate that the adequacy of diets observed among program families can be attributed to the program. A 29-page appendix tabulates the percent recommended dietary allowance for eight nutrients for each location where the data were gathered. (JR)

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AN EVALUATION OF THE INFLUENCE OF THE EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM IN MISSOURI

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The Nutrition Education Assistants and the Supervising Home Economists in the three areas used in this study gave generously of their time and energy to collect the data. Without their efforts, the study would have been impossible. Support was also provided by the Area Directors in these three areas. It was they who approved doing the study in a particular area, contacted appropriate local persons and made local arrangements.

Assistance in the analysis of data and writing the report was provided by Mildred Bradsher, Ann Hertzler and Ruth Lutz. Secretarial assistance was provided by Janice Craig and Lois Stuth.

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INTRODUCTION

During the 1960's, the Congress of the United States, through its Citizens' Board of Inquiry into Hunger and Malnutrition estimated there were fourteen million hungry people in this country.[1] No state is free of hunger anymore than any state is free of poverty.

A nationwide survey in 1965[2] was concerned with the food consumption of families in the United States. The results of this survey showed that 50 percent of the households had diets that were rated poor.[3] Nearly 40 percent of the households with incomes under $3,000. had poor diets. The percentages of households with good diets increased markedly with income.

The societal implication of malnutrition in this country are particular ugly. As former Senator Clark has pointed out, the mind tends to reject the evidence that children can and do starve in the most abundant and fruitful of all nations.[4] An approach which deals directly with those persons most affected by the problem has been characteristic of the efforts to deal with malnutrition.

The Expanded Food and Nutrition Education Program* (EFNEP) was introduced in the fifty states, Washington, D. C., the Virgin Islands, and Puerto Rico in 1968. The program was administered on the local level by the Cooperative Extension Service under the sponsorship of the United States Department of Agriculture. The primary objective of the EFNEP was to assist low income families with children to improve the nutritional adequacy of their diet. This was supplemented by several more specific objectives:

1. To increase knowledge of the relationship of nutrition to health and well-being;
2. To increase food buying skills to insure maximum value from the dollars invested in food;

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* Hereafter referred to as EFNEP

3. To develop food preparation skills in order to serve palatable meals and insure maxium preservation of food nutrients with minimum waste;
4. To develop skills in the care and storage of the family food supply;
5. To encourage eligible families to participate in the Food Stamp or Commodity Food Program:
6. To increase the ability of the family to manage the family resources including food stamps or commodity foods.

A key feature of the program is the paraprofessional Nutrition Education Assistant. She is a woman* who has a social and economic background similar to that of the families with whom she works. Upon being hired, the Nutrition Education Assistants are given several weeks of intensive orientation training. This is followed by regular in-service training. After their orientation training is completed, they teach low income homemakers, either individually or in small groups, showing them ways to improve the nutritional adequacy of their diets.

The EFNEP was started in Missouri in January, 1969. It began in five Extension Program planning location in the state: East-West Gateway, Kansas City, Mid-Missouri, Bootheel, and the Ozark Foothills Areas. There were initially 90 Nutrition Education Assistants. By the close of 1969, the program has been expanded in the two metropolitan areas and in the Bootheel and has been initiated in the Lake's Country Area. The total number of Nutrition Education Assistants had risen to 150. The program was extended to six additional locations in 1970. These were: ABCD, Kaysinger Basin, Mark Twain Ozark Gateway, Show-Me, and South Central Ozarks. (See map on page 2a.) As of March 30, 1972, the month in which these evaluation data were collected,

*All Nutrition Education Assistants in Missouri have been women. Some other states have employed male assistants.

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there were 186 Nutrition Education Assistants in twelve units in Missouri. These Assistants had enrolled 9,607 program families. There were 50,711 persons in these families, including 33,722 children.

THE NEED FOR EVALUATION

There is always the need for evaluation in a socially oriented program; therefore, tools for evaluation were built into the EFNEP from the very beginning. At the time of this study, monthly reports were made to the Extension Service, USDA, concerning the number of families enrolled in the program; the number visited on a monthly basis; the number of youth and volunteers worked with, and the number of Assistants doing the work. Every six months, data were collected regarding socio-economic characteristics of the families enrolled in the program, their food consumption habits, and their knowledge of basic nutrition. By examing these data across time, it is possible to see changes in the outreach of the program, changes in the characteristics of the families worked with, changed in their knowledge of nutrition, and most importantly, changes in their diets.

The data used to determine dietary adequacy were gathered by personal interview, obtaining a 24 hour food recall from each program homemaker once every six months. The Nutrition Education Assistant working with a given homemaker collected these data.

The adequacy of a homemaker's diet was assessed in terms of the number of the daily servings of each of the four food groups that she consumed. According to the EFNEP, an adequate daily diet is considered to be two servings of meat, two servings of milk, four servings of fruits and vegetables, and four servings of breads and cereals. No attempt was made to assess the adequacy in terms of the nutrients it contained.

The data on the homemaker's knowledge of basic nutrition were also gathered every six months by the Nutrition Education Assistants. Each homemaker was asked to name the foods she thought a person needed every day in order to be healthy. The foods named were classified according to the four basic food groups. A homemakers was said to have greater or less knowledge of basic nutrition, depending upon how many of the four basic food groups were represented by the foods she named.

The data indicate that, in terms of persons contacted, the EFNEP has been successful. As of March 31, 1972, the month in which the evaluation study was conducted, the average full-time eqivalent (FTE) Nutrition Education Assistant in Missouri had enrolled 49.5 program families. During that month she and her volunteer assistant visited an average of 36 of these families at least once. In addition, she visited with an average of 26 nonprogram families and 34 youth. Thus, in the course of the month, she taught nutrition to almost 100 persons.

When the diets of homemakers who had been in the program for varying lengths of time were compared, it was clear that those who had been enrolled at least six months had better diets than those newly enrolled. In the March 1972 recall, 50 percent of the newly enrolled homemakers reported at least one serving from each of the four food groups compared to 59 percent for homemakers who had been enrolled for a longer time. Consumption of all four basic food groups continued to improve for approximately eighteen to twenty-four months.

The data about knowledge of basic nutrition indicated that program homemakers increased their knowledge. When first enrolled in the EFNEP, only 57 percent of the homemakers named foods from each of the basic four food groups as being necessary for health. After three years of participation, over 80 percent could do this.

These data suggest that the EFNEP has been successful in its efforts. But, the data leave an important question unanswered: Can the increase in adequacy of diets which is observed among program families be attributed to the program?

OBJECTIVES OF THE STUDY

There were two primary objectives of this study; first to determine whether there were differences in the dietary behavior of program and control* families with regard to the program objectives. If there were behavior differences, it would be assumed that the EFNEP was the causal factor. The second objective was to determine if there were any characteristics which distinguished those program families whose diets were adequate from those program families whose diets were inadequate. This would provide needed information about the factors which influence food consumption.

With regard to the first objective, three hypotheses were developed. Each focused on a difference program objective. It was hypothesized:

1. Families who were participating in the EFNEP would have diets that were more adequate in terms of the Recommended Daily Dietary Allowance of selected nutrients than families who were not participating.
2. Families who were participating in the EFNEP would have higher scores on a measure of food buying skills than families who were not participating; and
3. Families who were participating in the EFNEP would have higher scores on a measure of nutrition knowledge than families who were not participating.

With regard to the second objective, it was hypothesized than an adequate diet for program families would relate positively with certain characteristics of the family. The expected influential characteristics were:

1. Race;

*A description of the control families is found in this report on page 9.

2. Homemaker's age;

3. Homemaker's education;

4. Family income;

5. Mass media availability;

6. Participation in public feeding programs; and

7. Participation in food stamp, commodity, and supplemental food programs.

It was also hypothesized that adequacy of family food consumption would be positively related to two characteristics of the program; the frequency of visits with the Nutrition Education Assistant and tenure in the program.

DESIGN OF THE STUDY

The twelve units of the EFNEP in Missouri are located in areas that range along the total continuum from urban to rural. Differences which are believed to be a function of the urban-rural nature of a particular area have been observed in the program. These differences include such things as the number of times that an Assistant visits with a homemaker, the likelihood that a homemaker will be visited in her home as opposed to being visited in a group, the possibility of growing a home garden, the use of food stamps as opposed to the use of commodity foods, the availability of public services, and the percentage of program children who are enrolled in 4-H type EFNEP activities.

There are, of course, other differences between an urban and a rural area which may have at least indirect influence upon a homemaker's acceptance of the program. Because of these differences, it was felt that the urban-rural nature of an area was an important factor to be considered in program evaluation. Thus, the three ares that were chosen for the evaluation study were representative of varying points along an urban to rural continuum. These areas were: East-West Gateway (St. Louis City, representing an urban

area); Mark Twain (Macon County, representing a small town area); and Ozark Foothills (Carter and Ripley Counties, which represent a rural area).

For every program area used in this study, another area that was adjacent and similar to it was chosen for use as a control area. For the East-West Gateway (City of St. Louis) it was possible to have the control area within the city since the EFNEP did not cover the entire city. For Mark Twain (Macon County) the control county was Linn. For Ozark Foothills (Carter and Ripley Counties) the control counties were Shannon and Oregon.

At the time of the study in two of the areas, East-West Gateway and Ozark Foothills, the EFNEP had been in operation for three years. Thus, it was possible to introduce another variable: tenure in the program. The sample of program families chosen for interviewing in these two areas were selected to represent families who had been in the program for varying lengths of time. In the third program area, Mark Twain (Macon County), this was not possible because the program had been in operation there for only one year.

It was decided that a sample of 200 program families and 200 control families would be appropriate for this study. One hundred of the program families and 100 of the control families were to be selected from East-West Gateway (St. Louis City). Fifty program families and fifty control families were to be selected from each of the other two areas. The Manual For Nutrition Surveys, by the National Institute of Health, reported that, "Experience indicates that a minimum of 15 families is required to give satisfactory data by means of the 24-hour recall questionnaire method within a population sample of approximately 1500 people."[5] At the time of this study, there were 1927 program families in East-West Gateway (St. Louis City), 106 in Mark Twain (Macon County), and 277 in Ozark Foothills (Carter and Ripley Counties). Thus, the chosen sample size should give satisfactory results.

In Mark Twain (Macon County), where the program has been in operation for only one year, the fifty program families were chosen at random from a total list of enrolled program families. In East-West Gateway (St. Louis City) and Ozark Foothills (Carter and Ripley Counties), where the program had been in operation for three years, the total list of program families was divided into four parts: those families who had been in the program less than seven months; those who had been in the program seven to twelve months; those who had been in the program thirteen to eighteen months; and those who had been in over eighteen months. No program families were selected for interviewing who had been in the program less than seven months. An equal number of program families were than randomly selected for interviewing within each of the other three time intervals. The random nature of the selections was insured by use of a table of random numbers.

Throughout the course of this study, assistance was provided by the Field Research Team of the Department of Agricultural Economics and Rural Sociology. It was this team that drew the control sample for use in this study. Cooperation was also obtained from the Division of Welfare. They provided the names of families in the control areas receiving public assistance and/or federally sponsored food assistance. The control families for this study were drawn from this list of persons and their neighbors. They were selected to be as nearly like the program families as possible with regard to certain characteristics: place of residence, receipt of welfare, number of children under nineteen years of age, age of homemaker, participation in a food assistance program, education of the homemaker and household income.

Each of the potential control families was visited by a member of the Field Research Team before interviewing to determine their eligiblity to be interviewed. If a family was not eligible because they did not match with

one of the program families, they were asked to supply the names of three additional families who were of circumstances similar to theirs. In this way, it was possible to include in the control sample persons who were not receiving welfare and/or participating in one of the food assistance programs.

THE DATA

All data were collected by interview. The interview schedule was developed by the members of the EFNEP Committee. Suggestions concerning the schedule were obtained from the EFNEP Advisory Committee, Dr. Norge Jerome of the University of Kansas Medical Center, and other qualified persons.

The final revision of the schedule was preceded by a pre-test. The pre-test consisted of administering the schedule of 13 program homemakers in the East-West Gateway area. The 13 homemakers used in the pre-test were eliminated from participation in the final collection of the data. Only two months elasped between the pre-test and the final collection of data, so the influence, if any, should have been minimal. The pre-testing was done by four members of the EFNEP State Committee. On the basis of the pre-test, revisions were made and the schedule was developed into its final form.

Details about the schedule are presented elsewhere in this report.

Collection of the Data

It was deemed important that persons who collected the data for the evaluation study should possess two characteristics: a knowledge of the subject matter of foods and nutrition and an ability to communicate effectively with the persons to be interviewed. After discussing these qualifications with Dr. Norge Jerome and the EFNEP Advisory Committee, it was decided that the Nutrition Education Assistants* met both of these qualifications. Thus, it was

*Hereafter referred to as NEA's or Assistants.

decided that the Assistants would do the interviewing for the evaluation study. However, it was felt that it would be unwise to have an Assistant interview the program families with whom she had been working, since some of the data could be construed as reflecting either favorably or unfavorably upon the Assistant and since the program homemakers might feel that they were being tested if their usual Assistant did the interviewing.

The Assistants received three days of intensive training in interviewing procedures and in understanding the interview schedule. This training was conducted by the Supervisor of the Field Research Team from the Department of Agricultural Economics and Rural Sociology. The training involved reviewing each question on the interview schedule, completing a practice schedule with a friend, and role playing, which included knocking on doors, introducing oneself, and dealing with some difficult problems that might be encountered in the process of data gathering. At the end of the three days of training, Assistants still having problems with the interviewing procedures were asked not to participate in the interviewing.

Interviews were begun on Monday, Tuesday, or Wednesday because it took three days to gather all the information from one family. This allowed interviews to be completed by Wednesday, Thursday, or Friday. Weekends were avoided in gathering the data because it was felt that families frequently eat differently on weekends than they do during the week.[6] An attempt was also made to avoid interviewing the day and shortly after welfare checks were distributed because this could affect family diets.

All data were obtained from the program homemaker.* The initial interview took approximately an hour, to an hour and a half. The Assistant

*For the purpose of this program, the homemaker is defined as the person in a given household who has primary responsibility for food preparation.

obtained the demographic information, nutrition knowledge, food buying skills, and food frequency data and asked the homemakers to recall what and how much her family had eaten at home in the 24 hours immediately preceding the interview. On the second and third days of the interview, additional family food consumptions records were obtained. This procedure is explained in more detail elsewhere in this report.

All data were gathered in March, 1972, within a one-week period in the Macon-Linn and Carter-Ripley-Shannon-Oregon areas and within two weeks in East-West Gateway. At the end of each day of interviewing, the NEA's completed interview schedules were reviewed and edited by the Supervisor of Field Research. Any data that were missing were to be gathered by the Assistant on her return visit to the family. Any inadequacies in gathering the food consumption data were explained to the Assistant so that she could improve her techniques.

Food Intake Data*

After consultation with Dr. Norge Jerome and the Foods and Nutrition Specialists on the EFNEP Committee, a procedure was developed which involved obtaining a record of each family's food consumption for 72 hours. The kind and amounts of food that were prepared and consumed by the family members at home during the 24 hours preceding the initial interview were recorded as recalled. To assist the homemakers in estimating the amounts of food prepared and eaten at home, the interviewers gave each homemaker a one cup dry measure and a set of four measuring spoons. There were to be a gift from the interviewer to the homemaker and were to be used by her in estimating the amount

*Assistance in writing this section of this report was provided by Mildred Bradsher, Associate Professor of Foods and Nutrition, State Foods and Nutrition Specialist, University of Missouri.

of food prepared and eaten. It was also felt that the small gift might be sufficient to induce the continued participation that was needed over a three-day period.

To minimize the problems associated with recalling the food prepared, the interviewers asked each homemaker to write down on a form which was left with her all the food that she or anyone else prepared for her family to eat at home during the next 24 hours, and who ate the food and how much was left over. Prepared foods that were bought and eaten outside the home were not included. Guests were included in the RDA* needs for the day in proportion to the amount of the day's food supply they consumed in the household. Their age and sex were recorded for this purpose.

On the second day, the interviewer returned to the family's home, reviewed what the homemaker had written and obtained more detailed information as it was needed. At that time, she left another form and asked the homemaker to continue for another 24 hours. On the third day, she returned to review what the homemaker had written and to be sure it was as accurate as possible.

After the third 24 hours of food consumption had been recorded, the interview of a family was completed.

Several aspects of this procedure helped to insure the accuracy of the data obtained. First, it was not necessary for the homemaker to estimate the amount eaten by a single person. Amounts were estimated in terms of that prepared for the total family. Thus, it was possible for the homemaker to speak in terms of one No. 2 can of green beans rather than a specific number of cups of green beans and to report that her family ate a 2 lb. loaf of bread rather than try to remember the number of slices consumed. Secondly, the interviewer visited the homemaker every day to help her record the

*RDA refers to Recommended Dietary Allowance.

information as accurately as possible. If the homemaker had not completed the food record, the interviewer helped her to do so. If she had completed it, the interviewer would question her about food items that she might have forgotten such as cream in coffee or spread on bread. She would also try to insure that the quantity estimated was as accurate as possible for both food prepared and food wasted. Of course, the daily visit by the interviewer insured that the information was recorded daily. Third, foods purchased and eaten outside the home were not included in the food records.

There is a considerable difference of opinion concerning the minimum number of days over which a dietary record must be kept to yield accurate information. Chalmers reports, "Although little factual information is available on the subject, many authorities feel that a dietary record covering a period of seven consecutive days with twenty consecutive meals is the shortest length feasible from the standpoint of accuracy. However, field units operating under the direction of the U.S. Public Health Service obtained dietary information by use of the one-day dietary record. They believed that a larger number of accurately taken one-day records are as useful as the smaller number of seven-day records."[7]

Chalmers goes on to report, "By use of variance components it was found that a dietary record need consist of only one day when characterizing the dietary intake of a group."[8] Similarly, Young has reported, "The pattern on the daily means for the group proved sufficiently stable to suggest that even less than a week's record would have provided an estimate of intake with little loss in precision."[9]

With this in mind and with an appreciation of the economic and time constraints under which we were working, it was decided that a three-day dietary appraisal would be most suitable for this evaluative study.

Nutrition Knowledge Data

For the purposes of this study the respondent's knowledge of nutrition was assessed by means of two questions, one of which had six sub-questions. The first question asked the respondent to identify two foods from a list of ten that would provide food value similar to that of milk. The two correct choices were cheese and ice cream. Among the eight incorrect choices were two beverages, so the person who view milk simply as a beverage might choose them as the correct response. Also among the incorrect choices were foods that are nutritious but which do not contain the same kind of food value as milk. These foods might be chosen by a person who simply views milk as "good for you." The other incorrect responses were food that simply fill your stomach. These might have been chosen by persons who view milk simply as the hunger quencher.

The second question asked the respondent to choose the more nutritious food from each of six pairs of foods. Each pair contained a food relatively high in nutrients and one relatively low in nutrients. Included were two pairs of vegetables, one pair of fruits, one pair of meats, one pair of snack foods, and one pair consisting of a protein food (cottage cheese) and a food advertised as protein (jello).

These two questions afford the respondent eight opportunities to reveal her understanding of food nutrients. In scoring the answers, the respondent received one point for each correct answer for a possible total score of eight.

Food Buying Skills

Two questions were used to test the respondent's knowledge of food buying. The first question had two parts; the first part dealt with buying canned

tomatoes and the other with buying a loaf of bread. A card picturing the labels of two cans of tomatoes was handed to the respondent who was asked to select the brand she would purchase for use in preparing soup. Brand X tomatoes were identified as "Whole Hand Selected" and the can weighed 14½ ounces. Brand Y tomatoes were not identified, but the can weighed 16 ounces. The cans were said to cost the same. A similar procedure was used to determine which loaf of bread the respondent would purchase. The two loaves weighed and cost the same. One was labeled "Enriched" and the other "Brick Oven Baked." The respondent was to state why she favored the food chosen. She received one point if she chose the correct can of tomatoes or loaf of bread for the correct reason.

The second question on food buying dealt with buying milk. The respondent was asked which was most expensive: fresh fluid milk, canned evaporated milk, or dry powdered milk. She was then asked which was the least expensive. She received one point for each correct response.

Factors Related to Family Food Consumption

A. Characteristics of the Homemaker

Questions were developed to obtain background data from each homemaker. These questions were designed as independent variables to determine if there are any characteristics which distinguish those program families with suitable diets from those with less adequate diets. Questions concerning the homemaker's race, age, education, family income, mass media availability and participation in food assistance and public feeding programs were designed to indicate who the homemaker is. These data were gathered on the assumption that who the homemaker is is closely intertwined with what she does.

The data collected indicate that at the time of the study there were differences in the adequacy of the various families diets, but it is not possible at this time to assess differing degrees of change in dietary habits. An examination of characteristics which distinguished families whose diets are of differing adequacy may, however, provide some insight into the factors which influence food consumption.

The first objective of this study will provide an answer about the effectiveness of the EFNEP in Missouri. The second objective will provide help in planning future educational programs in nutrition. Reh has said, "The mere knowledge of per capita food consumption and the nutritional adequacy of the diet is insufficient for planning practical program for improvement of the diet. Socio-economic and other data are required concerning the food consumption group."[10] Thus, information about characteristics which distinguish program families whose diets are adequate will be useful in planning for the future of the EFNEP.

1. Age

It was hypothesized that the age of the homemaker would be related to the quality of her family's diet. Specifically, it was hypothesized that the younger the homemaker, the better the diet of her family would be. Young and her associates found, "The young homemakers (under 40 years) appeared to do a somewhat better job in feeding their families than the middle-aged (40-60 years) or old (over 60 years) homemakers."[11]

Similarly, Sanjar and Scoma found that the mother's age was negatively associated with the child's food intake.[12]

Of course, there is nothing inherent in the aging process which would make one less inclined to feed one's family adequately. Therefore, it must be assumed that the relationship between age and adequacy of diet is in fact being caused by some additional factor such as the younger homemaker's greater education or her greater awareness of nutrition information. However, in the EFNEP, both younger and older homemakers are exposed to nutrition information. Therefore, if the hypothesized relationship between age and adequacy of diet is found, it may be due to younger homemakers' greater willingness to accept the principles taught by the Nutrition Education Assistant.

In a study of the social and psychological factors associated with the acceptance of new food products in Pennsylvania, Bylund[13] found that those homemakers who were most willing to try new foods were younger than those who were less willing. He suggests that for physiological, psychological, and sociological reasons the tendency to try new food products drops sharply with age.

2. Education

It was hypothesized that the greater a homemaker's educational level, the more adequate would be the diet she served her family. Davis reviewed the studies of vitamin and mineral nutrition in the United States between 1950 and 1968 and reported, "A number of studies examined the relationship between educational level and dietary and/or biochemical data. Several of these found

a direct relationship in that individuals with a higher educational level appeared to have better nutrition."[14]

The hypothesized relationship between education and dietary adequacy is based on the assumption that the greater one's educational level, the greater the chances that one would have encountered nutritional information and the greater will be one's awareness of the nutrition information that is presented through the mass media.

It could be argued, of course, that all homemakers who are in the EFNEP have received education about nutrition and thus their original educational level should have no influence upon their dietary adequacy. However, this is not necessarily so. The number of years of formal education obtained by a homemaker is probably a good indication of her willingness to learn. Thus, those homemakers with more education will be more willing to learn from the Nutrition Education Assistant and thus more likely to feed their families more adquately. Bylund[15] did in fact, find such a relationship in his study.

Since the program homemakers have low incomes and low income tends to be associated with lower educational levels, it was not expected that the educational level of the program homemakers in this study would cover a very large range. Indeed, as of March 1972, the month in which this evaluation study was conducted, eighteen percent of the program homemakers had an eighth grade education or less. However, it was expected that the anticipated relationship between

education and dietary adequacy could be observed even within a narrow range of educational level.

3. Income

Although all of the homemakers in the EFNEP are supposed to have low income, it was hypothesized that within a narrow range represented by program families, there would be a direct positive relationship between income and dietary adequacy. In his review of studies, Davis found that a direct relationship apparently exists between income and diet with higher income groups having better diet than low income groups. This appears to be true even in a narrow low income range. The USDA 1955 and 1965 nationwide surveys of the nutrient value of food purchases found that for all nutrients there was an inverse relationship between the percentage of households whose purchases were below the RDA and income.

These three variables--age, education, and income--are, of course, intimately intertwined. Of the three, however, educational level seems by far the most important in determining dietary adequacy.

4. Race

While there may be conflicting opinion regarding the influence of racial difference on dietary adequacy, the hypothesis for this study was based upon the second report by the Citizens' Board of Inquiry into Hunger and Malnutrition in the United States.[16] Preliminary results of this ten-state nutrition survey indicated that in the low income states of Texas, Louisiana, Kentucky, West Virginia and South Carolina

by any measure used, black families have a poorer nutritional status than white families.

5. Mass Media Availability

It is sometimes said that low income persons tend to be isolated from the general society. It was hypothesized that homemakers who overcame this isolation to some extent by reading newspapers and magazines and by listening to radio and television would serve their families more nutritionally adequate meals. This was hypothesized because communication channels are often employed to distribute information about and stimulate interest in foods and nutrition.

6. Participation in Food Assistance Programs

There is some evidence that participating in a federally sponsored food assistance program does not increase the nutritional adequacy of the diets of low income families. Madden and Yoder[17] studied the impact of food stamps and commodity distribution on the dietary adequacy of low income families in rural Pennsylvania. They found that commodity foods have little effect on family diets. Madden and Yoder suggested that families who receive food assistance seem to use the money they had previously spent for food for other items rather than supplementing the food assistance with the money that had been previously budgeted for food.

A report by Feaster[18] noted that at the time of enrolling in the EFNEP the dietary practices of families participating in federally sponsored food programs was similar to that of the families not participating in a

food assistance program. However, this report noted that after six months of participating in the EFNEP, the program homemakers had made important improvement in the dietary adequacy of their families. Thus, it was hypothesized that those program families whose diets were better would be the ones who were participating in a federally sponsored food assistance program. This hypothesis is based on the assumption that if a family were utilizing money that could be spent on food for other family expenses, then upon learning of the necessity to eat adequately, it would be possible for them to move that money to food purchases and thus to improve the adequacy of their diet.

7. Participation in Public Feeding Programs

Although the food eaten outside the home was not used in calculating the dietary adeuqacy of the families who participated in this evaluative study, it was felt that food eaten outside of the home at one of the federally sponsored feeding programs such as school lunch or Head Start breakfast was indicative of a positive attempt to improve family diet. It was assumed that homemakers who encourage their children to participate in these feeding programs would also be interested in improving the adequacy of the food consumed in the home. Therefore, it was hypothesized that those families who participated in the federally sponsored feeding program would be the ones with the more adequate nutritive intake.

B. Characteristics of the Program

1. Frequency of NEA Visits

There is conflicting evidence concerning the influence that frequency of visits from the Nutrition Education Assistant has upon the dietary adequacy of a family. Madden and Yoder concluded that their analyses "do not indicate any significant difference in adequacy of dietary intake related to the number of nutrition aide visits."[19] However, fewer than 10 percent of the homemakers that they interviewed were participating in the EFNEP and this sample was probably too small to allow a definitive conclusion to be drawn.

Feaster reported that at the end of six months participation in the EFNEP, "the amount and intensity of food and nutrition education received by a homemaker--measured by number of program aide visits between food readings--had a positive effect on diet improvement."[20] For purposes of this study it was hypothesized that program families with a more adequate diet would be the ones who had been more frequently visited by their Nutrition Education Assistant.

2. Tenure in Program

Questions may arise as to how long one should spend attempting to improve dietary adequacy. There is also the question of what constitutes improvement. Differing answers to these questions result in differing beliefs about how long a family should be enrolled in this program. An examination of the food recall data that are gathered every

six months indicates that in terms of recommended minimum serving, program homemakers make little improvement in their family's food consumption beyond eighteen to twenty-four months of program participation. This is in keeping with the results of an analysis made by the Synectics Corporation[21] which found that even homemakers who initally were serving their families only half or less of the recommended minimum servings should be able to make sufficient progress in one or two years of participation to assure that they had received the full potential from the program.

However, the Nutrition Education Assistants, the persons who work most directly with the families, assure us that there is a reason to keep a family in the program beyond two years. They tell us that sometimes progress is made very slowly, but that progress is indeed made. Due to this dispute, it was decided to examine the effect of tenure upon the adequacy of a program homemaker's family food consumption.

Food Frequency Data*

Assessment of nutrient intake can pose many problems in a program such as this. Investigators are, therefore, interested in employing an adequate substitute method. It is, of course, possible to describe dietary habits in terms other than nutrient intake. These descriptions "can be made according to many variables, among which are the spacing and pattern of food intakes, the environment in which the food is eaten, the speed of eating, the changes in food habits

*Assistance in writing this section was given by Ann Hertzler, Assistant Professor of Foods and Nutrition, State Foods and Nutrition Specialist, University of Missouri-Columbia.

and the frequency that foods are consumed."[22]

Results obtained by the use of the food frequency interview method have been compared with the results obtained by other methods of assessing dietary adequacy. Stefanik and Trulson compared the results obtained by using the food frequency interview to those obtained by using a seven-day diet record and by using research histories. They found that essentially the same information was yielded. The result was "the belief that a shorter interview method with coded responses could be used to obtain base-line descriptive dietary information on large samples of men with fair accuracy relative to two established techniques."[23] Thomas and her associates[24] obtained seven-day food intake records and twenty-four hour recall records from a group of pregnant women. These data were simplified into food frequency data by recording the number of servings of foods in various food groups that the women had eaten. This method of appraising dietary intake of women was successfully compared to results obtained by records of chemical analyses of diets eaten by mothers and children; with records from direct calculations with tables of food composition; and with records of dietary intake obtained and rated in another laboratory.

A. The Use of Fruits and Vegetables by Low Income Persons

Kelsey reviewed the studies dealing with nutritional status and dietary evaluation which were conducted in the United States between the years of 1957 and 1967. She concluded, "In the dietary evaluation studies, on the whole, ascorbic acid, vitamin A, calcium, and iron were the nutrients most commonly found in the diets in amounts below the Recommended Dietary Allowances."[25]

A review of the studies of vitamin and mineral nutrition in the United States between 1950 and 1968[26] found that for all

nutrients studied there was an inverse relationship between the percentage of households whose purchases were below the RDA and income. This was particularly true for vitamin C, vitamin A, and calcium.

In an in-depth analysis of the impact of the EFNEP on low income families, Feaster[27] found that when homemakers first enrolled in the program, only fourteen percent of them were consuming an adequate amount of fruits and vegetables each day. At the end of six months participation, this percentage had increased significantly to twenty-eight percent, but indicated that the consumption of fruits and vegetables was considerably less adequate for all the homemakers than was the consumption of any of the other four food groups.

This same trend was observable in the data from the state of Missouri. Data obtained from the food recalls of program homemakers indicate that twenty-six percent of the homemakers had an adequate consumption of fruits and vegetables when enrolled and only thirty-five percent ate enough of these foods after three years of program participation. Regardless of the length of participation in the EFNEP, the consumption of fruits and vegetables is always the most inadequate in relation to the other three basic food groups.

B. The Present Study

The frequency with which the subjects of this evaluation study consumed fruits and vegetables containing vitamin A and vitamin C was obtained. The purpose for obtaining this information was (1) to determine whether program families consumed fruits and vegetables containing vitamin A and vitamin C more frequently than nonprogram families; (2) to determine if the families whose diets were judged to be adequate by means of the food record were the same families

who were frequently consuming fruits and vegetables; and (3) to identify the fruit and vegetables that are familiar to Missouri families.

The interviewers were instructed that in gathering the food frequency data they were to record the consumption of a given food in any form. This procedure was based on the assumption that families more familiar with a given flavor would be more likely to use the food in a variety of forms and that providing the food in the home indicates that the family members recognize the item as food.

A computer program was written to calculate different frequency scores in order to investigate the most valid method of scoring frequency.

1. Nutrient Frequency Scores:

Score 1 was derived by multiplying an approximate nutrient content times the coded frequency. The nutrient values of vitamin A (nearest 100 I.U.) and vitamin C (nearest 10 mg.) were the amounts listed in one serving. The frequency codes were:

0) never (* if never heard of)
1) rarely or occasionally, a couple of times a year, or have tasted
2) only in season
3) once a month or more
4) once or twice a week
5) three to six times a week
7) daily
8) several times a day

Score 2 was derived by revaluing the frequency codes in order to preserve the order of the actual frequency:

0 to 1 = 0	4 = 4	7 = 16
2 to 3 = 1	5 = 8	8 = 32

2. Food Frequency Count

Two food frequency counts were used for each family. The total number of foods on the frequency lists consumed by each family at a frequency of 0 to 3 (Score 3) or 4 or greater (Score 4). Individual greens and wild greens were included in counts but as a group in the frequency calculations.

Coding the Data

All the data in this study were coded by a small group of senior students majoring in nutrition at the University of Missouri. All foods consumed by a given family during the seventy-two hours covered by this study were recorded in terms of grams of edible food on the basis of available data.[28] The dietary needs of a family were determined by each family member's age and sex. The dietary needs of an adult female were used as the base in making these calculations. The dietary needs of fourteen other categories of ages and sexes were developed in the basis of this adult female standard.

If a person consumed all of his food for one day at home, he was recorded as having obtained 100 percent of his dietary needs from the food that was consumed by the family during the day. Each of the major three meals consumed during the day was assumed to contribute twenty-five percent of a person's daily dietary needs. Thus, if a person ate one of these three meals away from home, he was said to have twenty-five percent less than 100 percent of his dietary needs fulfilled by food consumed at home. Each of two snacks that were measured in the course of this study was assumed to contribute ten percent of a person's daily dietary need. If a person consumed one of these snacks away from home, it was said that he received ten percent less than 100 percent of his dietary needs from the food consumed at home.

On the basis of this, each person's percent of dietary needs to be fulfilled by the family consumed at home was calculated. It a guest was present and ate any food with the family, the guest's age and sex were recorded. If the guest ate one of the three major meals with the family, it was coded that the meal met twenty-five percent of this guest's dietary needs. If he ate a snack with the family, the snack met ten percent of his dietary needs.

The Computer Program

A computer program was developed at the University of Missouri to process the information. The program calculates the nutrient content of foods as listed in USDA Handbook No. 8, "Composition of Foods." In addition, the program includes certain foods which have been added to the nutrient file by the Dietetics Department of the University of Missouri Medical Center. The program provided for the following computation of the nutrient content for food: energy, protein, total fat, saturated fat, linoleic acid, unsaturated/saturated fat ratio, cholesterol, carbohydrates, iron, Vitamin A, thiamine, riboflavin, Vitamin C, niacin, and niacin equivalent. The program also computed the percent of the recommended dietary allowance for each day according to the requirements of the person eating that day. The standard deviation was also calculated for this average percentage for the period of the study.

PRESENTATION OF DATA AND DISCUSSION

The following data represents the information collected in order to test the effectiveness of the Expanded Food and Nutrition Education Program in Missouri.

Characteristics of the Sample

The characteristics of the sample on which the study is based are given in Table 1. The control and program sample were selected to represent comparative groups in three areas of the state. The data comparing the age of the homemaker, education of the homemaker, number of children in the home, median income, race and percent receiving welfare are given in Table 1.

TABLE 1
DESCRIPTION OF PROGRAM AND CONTROL HOMEMAKERS

Characteristic	Mark Twain		East-West Gateway		Ozark Foothills	
	Control (50)	Program (50)	Control (34)	Program (109)	Control (51)	Program (51)
Age of Homemaker	31.940	32.880	37.118	38.551	36.196	37.765
Education of the Homemaker	10.280	10.820	10.382	10.192	9.020	8.039
Number of Children in the Home	3.280	3.440	3.730	2.950	3.451	3.412
Median Income	3880	4556	3266	3444	2750	3466
Race - % White	96	92	23.5	30.3	100	100
Receive Welfare - %	36	24	47.1	52.3	45.1	24.0

Program and Control homemakers were exceptionally well matched regarding age, education level and number of children in the home. In the Ozark Foothills, the educational level of the control homemakers was higher than that of program homemakers. In the East-West Gateway, the control families had a slightly greater average number of children in the home than program families.

The greatest difference in homemakers' characteristics was in the median reported income. In each area of the state, the program homemakers had a higher reported median income than the control sample. A detailed breakdown of the income distribution of the sample is given in Table 2.

TABLE 2
INCOME DISTRIBUTION OF FAMILIES

Program Families	Mark Twain		East-West Gateway		Ozark Foothills	
	No.	%	No.	%	No.	%
Less than $1,000.	2	4.0	10	9.2	4	7.8
$1,000 -- $1,999	3	6.0	17	15.6	9	17.6
$2,000 -- $2,999.	6	12.0	21	19.2	9	17.6
$3,000 -- $4,999.	18	36.0	27	24.8	15	29.4
$5,000 -- $7,499.	16	32.0	16	14.7	11	21.6
$7,500 -- $9,999.	1	2.0	10	9.2	2	3.9
$10,000 or over	4	8.0	7	6.4	1	2.0
Control Families	**Mark Twain**		**East-West Gateway**		**Ozark Foothills**	
	No.	%	No.	%	No.	%
Less than $1,000.	6	12.0	1	2.9	1	2.0
$1,000 -- $1,999.	2	4.0	5	14.7	14	27.5
$2,000 -- $2,999.	5	10.0	5	14.7	14	27.5
$3,000 -- $4,999.	27	54.6	15	44.1	16	31.4
$5,000 -- $7,499.	8	16.0	6	17.6	5	7.8
$7,500 -- $9,999.	1	2.0	2	5.9	1	2.0
$10,000 or over	1	2.0	0	0	1	2.0

The control sample in each location has a higher percentage of families in the $3,000-$3,999 income range. The program families have a somewhat wider distribution, both above and below this income range. It is well to remember that income data is collected on a regular basis from program families. It is likely that the control families gave a conservative estimate of their income to the interviewer.

A larger percentage of the control families were receiving welfare than program families. This was no doubt due to the process used in selecting the control sample. (See page 9). The Welfare office was the starting point for the selection of the control sample.

Considering all characteristics at one time, the control sample was considered comparable to the program sample.

Adequacy of Diet: Control Vs. Program

Homemakers were asked to keep a record of the food that had been prepared and served in their households for a consecutive three day period. A computer was used to determine the nutrient composition of the food that had been served. The nutrient composition of the foods consumed was compared with recommended dietary allowance needs of the family members. In this way, it was possible to determine the percentage of recommended dietary allowance needs fulfilled by the food served at home. This means of analysis enabled us to pinpoint more precisely the nutritional strengths and weaknesses of this educational program. The percent of recommended dietary allowances was calculated for protein, calcium, iron, vitamin A, riboflavin, vitamin C, niacin equivalent and thiamine.

The percentage of RDA nutrient needs provided by the food served in the home was not normally distributed. Therefore, the median of the percentage of recommended dietary allowance needs provided was used to represent the measure

of central tendency for the group rather than an arithmetic average or mean. Table 3 on page 34 give a comparison of the median percent of recommended dietary allowance of each nutrient consumed by program and control families in each of our sample areas.

On the basis of these data, the diet of program families appears to be not consistently better than that of control families. The program families in the Mark Twain units consumed a higher percentage of the RDA of the following: Calcium, vitamin A, riboflavin, vitamin C, niacin and thiamine. However, both program and control families were consuming adequate amounts of riboflavin, vitamin C and niacin. In the East-West Gateway unit, the program families consumed a higher percentage of the RDA for the following: Calcium, iron and vitamin C. However, control families in this area consumed more adequate amounts of protein, vitamin A, riboflavin, niacin and thiamine. Both program and control families consumed adequate amounts of protein, riboflavin, vitamin C, niacin and thiamine. In the Ozark Foothills unit, program families consumed a higher percentage of the RDA of the following: Protein, iron, vitamin A, vitamin C and niacin. Control families in this area consumed more adequate amounts of: Calcium, riboflavin and thiamine. Both program and control families consumed adequate amounts of: Protein, riboflavin, Niacin and thiamine.

It is interesting to note that calcium, vitamin A and iron all score below the amounts recommended by the National Research Council in the three units. Thus these are the nutrients that should receive priority consideration when designing educational programs for low income people in these areas of the state.

Nutritional Adequacy Score

Families who consumed two-thirds (67 percent) or more of the RDA for the

TABLE 3
MEDIAN PERCENT RECOMMENDED DIETARY ALLOWANCE

Mark Twain	Program		Control	
	Med.	Q*	Med.	Q
Protein	140.0	46.6	139.6	45.3
Calcium	77.7	31.4	71.5	33.5
Iron	81.3	27.6	81.5	21.8
Vitamin A	84.0	45.0	76.5	48.0
Riboflavin	111.9	35.9	102.5	39.9
Vitamin C	126.7	66.0	118.5	70.0
Niacin	178.0	63.0	172.8	59.4
Thiamine	103.0	38.6	95.5	33.7
East-West Gateway				
Protein	142.83	49.61	162.00	39.25
Calcium	64.50	31.08	55.50	27.00
Iron	82.10	28.00	80.00	19.67
Vitamin A	74.50	57.70	80.50	55.38
Riboflavin	106.00	40.61	117.50	41.13
Vitamin C	105.50	77.86	99.50	46.63
Niacin	195.83	63.90	203.00	62.13
Thiamine	108.00	44.10	113.25	39.50
Ozark Foothills				
Protein	162.2	48.4	154.2	41.9
Calcium	87.0	32.8	99.0	40.2
Iron	102.3	31.8	92.4	24.7
Vitamin A	80.7	40.7	67.2	33.2
Riboflavin	122.0	42.9	127.0	48.6
Vitamin C	85.0	45.2	82.0	49.0
Niacin	202.0	59.5	184.2	54.6
Thiamine	115.0	42.2	123.0	36.0

*Q represents the range of the middle 50 percent of scores. This gives a measure of dispersion.

eight nutrients in the study for the three day dietary record were considered to have adequate diets. Those who consumed one or more nutrients below the 67 percent level were classed as inadequate. By constructing a nutrition adequacy score consisting of the percentage of families meeting two-thirds or more of the RDA for the eight nutrients in the study, we have an additional basis for comparing the dietary adequacy of program and control families.

TABLE 4
NUTRITIONAL ADEQUACY SCORE

Unit	Program	Control
Mark Twain	44.0	40.0
East-West Gateway	35.78	35.29
Ozark Foothills	39.22	50.98

In the Mark Twain units, a greater percentage of program than control families was consuming adequate amounts of all eight nutrients. This difference was encouraging.

In the East-West Gateway unit, the nutritional adequacy score was essentially the same for program and control families indicating that an equal percentage of both groups were consuming adequate amounts of all eight nutrients.

The nutritional adequacy score for program families in the Ozark Foothills was less than that for control families.* More control than program families were consuming adequate amounts of all eight nutrients.

In none of the areas was the difference in nutritional adequacy score of program and control groups so divergent as to be considered statistically significant.

*See discussion under the influence of tenure and nutritional adequacy on page 45.

Food Buying Skills

The food buying skills score represented the skill the homemaker demonstrated in selecting the correct brand of tomatoes; the correct loaf of bread; and identifying the least and the most expensive form of milk.

TABLE 5
FOOD BUYING SKILLS

Unit	Program	Control	p =
Mark Twain	3.32	2.92	.005
East-West Gateway	2.819	2.471	.05
Ozark Foothills	2.804	2.961	ns.

With the exception of the Ozark Foothills unit, where the control group scored higher by a non-significant margin, the program homemakers demonstrated greater food buying skills.

Nutrition Knowledge

The nutrition knowledge score clearly favors the program homemaker.

TABLE 6
NUTRITION KNOWLEDGE

Unit	Program	Control	p =
Mark Twain	7.58	7.10	.25
East-West Gateway	7.156	6.412	.01
Ozark Foothills	7.255	6.412	.01

The nutrition knowledge scores for program families in the East-West Gateway and Ozark Foothills units are significantly higher than those of the control families. While not significant, the score in the Mark Twain unit continues to show the same pattern of higher knowledge for program homemakers. One objective of the program was to increase homemaker knowledge regarding nutrition and the evidence on this point clearly bears out the progress made in reaching this objective.

Food Frequency Analysis of Fruit and Vegetable Consumption

The fruits and vegetables listed in Table 7 on page 38 are the number and percentage of families consuming these foods weekly or more often where there was at least a 10 percent difference between control and program families. In the Mark Twain unit, sixteen fruits and vegetables were consumed weekly or more often by program than control families. The control families consumed only one vegetable (green beans) at a greater frequency than the program families. In the East-West Gateway unit, there were four fruits and vegetables consumed at a greater frequency by program families than control families. Two foods were consumed to a greater extent by the control families. In the Ozark foothills unit, there were eight fruits and vegetables consumed at a greater frequency by program than control families. There were four fruits and vegetables consumed more frequently by control families.

A correlation analysis of the food frequency scores* for Vitamin A and Vitamin C was done with thirteen sociological variables. These variables were: group visits, age, individual visits, income, marital status, work status of homemaker, community awareness, church attendance, race, education, food supplement program, public feeding programs and mass media availability.

*See page 27 for description of score.

The correlation and their significance are given for each of the units in Table 8 on page 39 and 40. There were eight correlations statistically significant at a probability level of .05 or higher. Seven of these were in the East-West Gateway unit.

Vitamin C frequency score was positively correlated with group visit, individual visit, church attendance, race and mass media availability. Vitamin A score was positively correlated with group visit and race for the East-West Gateway unit. The Vitamin C score was negatively correlated with food supplement programs in the Mark Twain unit.

TABLE 7
USE OF FRUITS AND VEGETABLES BY NUMBER AND PERCENT OF FAMILIES IN UNIT

Mark Twain	Control		Program			Control		Program	
	No.	%	No.	%		No.	%	No.	%
Lima beans	6	12.0	11	22.0	Mustard greens	4	8.0	13	26.0
Green beans	39	78.0*	33	66.0	Turnip greens	2	4.0	10	20.0
Broccoli	1	2.0	6	12.0	Spinach	6	12.0	20	40.0
Brussel sprouts	1	2.0	7	14.0	Bananas	26	52.0	33	66.0
Cabbage	16	32.0	30	60.0	Fruit cocktail	7	14.0	15	30.0
Carrotts	23	46.0	30	60.0	Lemons	4	8.0	9	18.0
Cauliflower	2	4.0	7	14.0	Peaches	18	36.0	27	54.0
Corn	36	72.0	42	84.0	Tomato soup	9	18.0	15	30.0
Greens	6	12.0	20	40.0					
East-West Gateway									
Celery	19	55.9	78	71.6	Grapefruit	13	38.2	67	61.5
Chili peppers	10	29.4*	9	8.3	Lemons	13	38.2	67	61.5
Tomatoes	25	73.5	94	86.2	Peaches	21	61.8*	52	47.7
Ozark Foothills									
Green beans	41	80.4*	32	62.7	Watercress	1	2.0	8	15.7
Cabbage	21	41.2	29	56.9	Tomatoes	45	88.2*	38	74.5
Carrots	20	39.2	29	56.9	Apples	36	70.6*	27	52.9
Celery	14	27.5	22	43.1	Orange drink	33	64.7*	26	51.0
Greens	14	27.5	23	45.1	Prunes	26	51.0	32	62.7
Mustard greens	12	23.5	20	39.2	Turnip greens	10	19.6	19	37.3

*Indicates greater use by control families

TABLE 8 - RELATIONSHIP BETWEEN SOCIOLOGICAL MEASURES AND VITAMIN A AND C FREQUENCY MEASURES

Sociologoical Measure	Unit	Vitamin A Correlation	Vitamin A Significance	Vitamin C Correlation	Vitamin C Significance
Group Visit	East-West Gateway	.23	(.015)	.34	(.001)
	Mark Twain	.05	(.741)	.01	(.949)
	Ozark Foothills	.06	(.668)	.03	(.820)
Age	East-West Gateway	.16	(.097)	.17	(.072)
	Mark Twain	.09	(.534)	-.13	(.339)
	Ozark Foothills	.17	(.222)	.04	(.783)
Individual Visit	East-West Gateway	.16	(.099)	.23	(.016)
	Mark Twain	.08	(.581)	.01	(.947)
	Ozark Foothills	.15	(.300)	.20	(.169)
Income	East-West Gateway	-.02	(.814)	.00	(.969)
	Mark Twain	.02	(.868)	.07	(.651)
	Ozark Foothills	.09	(.552)	.07	(.617)
Marital Status	East-West Gateway	.05	(.603)	.04	(.688)
	Mark Twain	.13	(.375)	.07	(.661)
	Ozark Foothills	-.11	(.455)	-.20	(.151)
Work Status of Homemaker	East-West Gateway	-.04	(.676)	-.07	(.476)
	Mark Twain	.03	(.859)	.05	(.744)
	Ozark Foothills	.09	(.525)	.02	(.870)
Community Awareness	East-West Gateway	-.11	(.260)	-.12	(.230)
	Mark Twain	-.16	(.274)	-.24	(.089)
	Ozark Foothills	.24	(.088)	.15	(.286)
Church Attendance	East-West Gateway	.06	(.553)	.19	(.046)
	Mark Twain	.06	(.693)	.16	(.267)
	Ozark Foothills	-.09	(.549)	-.03	(.829)
Race	East-West Gateway	.36	(.001)	.33	(.001)
	Mark Twain	.06	(.693)	.01	(.942)
	Ozark Foothills	99.00	(----)	99.00	(----)

TABLE 8 - RELATIONSHIP BETWEEN SOCIOLOGICAL MEASURES AND VITAMIN A AND C FREQUENCY MEASURES

Sociological Measure	Unit	Vitamin A		Vitamin C	
		Correlation	Significance	Correlation	Significance
Education	East-West Gateway	-.01	(.887)	.06	(.498)
	Mark Twain	-.14	(.344)	-.01	(.931)
	Ozark Foothills	.01	(.958)	.12	(.385)
Food Supplement Program	East-West Gateway	.02	(.836)	-.05	(.602)
	Mark Twain	-.11	(.458)	-.31	(.026)
	Ozark Foothills	.01	(.958)	.12	(.385)
Public Feeding Program	East-West Gateway	-.05	(.590)	-.13	(.165)
	Mark Twain	-.02	(.883)	-.17	(.247)
	Ozark Foothills	.14	(.313)	.15	(.304)
Media	East-West Gateway	.097	(.314)	.24	(.012)
	Mark Twain	.07	(.632)	.12	(.388)
	Ozark Foothills	.15	(.293)	.19	(.187)

Program Homemakers and Adequacy of Diet

The relationship between selected characteristics of program homemakers and adequacy of diet was examined. The characteristics considered were age of homemaker, education of homemaker, annual family income, race, madd media availability, participation in food assistance programs, participatation in food assistance programs, participation in public feeding programs and percent of church attendance. Data are given in Table 9.

The data reveal that of all of the sociological characteristics examined educational level is related to the nutritional adequacy of the homemaker to a greater extent than any other characteristic ($p=.02$). Also closely associated with dietary adequacy was mass media availability ($p=.10$) and percentage of church attendance ($p=.10$). Mass media availability is closely related to the educational level of the homemaker. The data show that age, income, race, marital status, participation in food assistance programs and public feeding programs are not significantly related to nutritional adequacy as defined in this study.

A variable entitled Community Awareness was computed. This variable involved giving one point for each, if the homemaker knew and correctly identified the location of the head start program, the Public Health Service, and the food stamp or commodity foods office for her community. Scores on this variable were very close. Those with inadequate nutrition scored as well as, or in East-West Gateway, considerably better than the program homemakers with an adequate level of nutrition. The familiarity with the location of the headstart program, the Public Health Service, and the government food program office bear no relation to nutritional adequacy as reflected in this study.

TABLE 9
RELATIONSHIP BETWEEN SELECTED CHARACTERISTICS OF PROGRAM HOMEMAKERS AND ADEQUACY OF DIET

CHARACTERISTIC	EAST-WEST GATEWAY		MARK TWAIN		OZARK FOOTHILLS		TOTAL	
	Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
Age of Homemaker								
25 years or less	7	16	3	3	3	3	13	22
26 - 35 years	11	18	12	19	8	6	31	43
36 - 45 years	8	17	5	3	4	15	17	35
46 or older	11	21	2	3	3	9	16	33
	X^2 = 7.67 ns		X^2 = 2.40 ns		X^2 = 5.86 ns		X^2 = 6.97 ns	
Education of Homemaker								
8th grade or less	6	21	2	6	5	23	13	50
9th - 12th grade	21	25	5	9	7	8	33	42
High school graduate	7	19	13	13	6	2	21	34
High school plus	1	3	1	0	0	0	2	3
	X^2 = 5.8 ns		X^2 = 3.21 ns		X^2 = 10.10 p .006		X^2 = 9.90 p .02	
Annual Family Income								
Less than $1000.	4	7	0	2	1	3	5	12
$1,000 — $1,999.	6	11	0	3	2	7	8	21
$2,000 -- $2,999.	8	13	4	2	4	5	16	20
$3,000 -- $4,999.	9	18	8	10	5	10	22	38
$5,000 or more	10	23	10	11	6	8	26	42
	X^2 = 5.15 ns		X^2 = 7.27 ns		X^2 = 2.44 ns		X^2 = 4.41 ns	
Race								
White	11	22	21	25	18	33	50	80
Nonwhite	26	50	1	3	0	0	27	53
	X^2 = .02 ns		X^2 = .07 ns				X^2 = .29 ns	

TABLE 9
RELATIONSHIP BETWEEN SELECTED CHARACTERISTICS OF PROGRAM HOMEMAKERS AND ADEQUACY OF DIET

CHARACTERISTIC	EAST-WEST GATEWAY		MARK TWAIN		OZARK FOOTHILLS		TOTAL	
	Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
Mass Media Availabilty Score	4.3	3.9	5.1	4.4	3.9	3.3	4.4	3.9
	T = 0.87 ns		T = 1.10 ns		T = 1.12 ns		T = 1.88 p=.10	
Food Assistance Programs								
Yes	19	44	10	9	16	29	45	82
No	18	28	12	19	2	4	32	51
	X^2 = 0.965 ns		X^2 = .44 ns		X^2 = .12 ns		X^2 = .22 ns	
Public Feeding Programs								
Yes	33	12	14	19	17	28	43	80
No	25	38	8	9	1	5	34	52
	X^2 = 1.44 ns		X^2 = .001 ns		X^2 = .31 ns		X^2 =.28 ns	
Marital Status								
Married	12	34	20	20	15	23	47	77
Not married	25	38	2	8	3	10	30	56
	X^2 = 2.175 ns		X^2 = 2.922 ns		X^2 = 1.157 ns		X^2 = 0.190 ns	
Percentage of church attendance	33	37	55	30	52	32	44	34
	T = .47 ns		T = 2.27 p .05		T = 1.61 ns		T = 1.66 p .10	
Community Awareness Score	1.108	1.431	1.727	1.786	1.778	1.727	1.442	1.579
	T = 1.8765 ns		T = 0.2401 ns		T = 0.2725 ns		T = 1.1556 ns	

Tenure in Program

The important variable of the effect of continued participation in the program was examined in two areas. Following are the data and the discussion of it as it relates to continued participation of program families in the Expanded Food and Nutrition Education Program.

TABLE 10
CHARACTERISTICS OF HOMEMAKERS RELATED TO TENURE IN PROGRAM

Characteristic	East-West Gateway			Ozark Foothills		
	6-12 months (28)	13-18 months (38)	Over 18 months (33)	6-12 months (19)	13-18 months (16)	Over 18 months (16)
Age of Homemaker	34.632	38.711	42.879	36.895	33.313	43.250
Education of the Homemaker	9.971	10.256	10.121	7.947	8.375	7.813
Number of Children in the home	2.368	3.421	3.091	3.579	3.313	3.313
Median Income	$3,250	$3,364	$3,626	$3,200	$4,142	$2,667
Race - % White	34.2	23.7	33.3	100	100	100
Receiving Welfare - %	55.3	50.0	51.5	78.9	37.5	68.8

In the East-West Gateway unit there was a tendency for the age of the homemaker and the median income to increase with tenure in the program. The percent receiving welfare and racial composition did not change appreciatively. Those homemakers in the program less than a year at the time this data were collected had slightly fewer children.

In the Ozark Foothills unit, the group in the program for 13-18 months were younger, had more years of education, higher media income and smaller percentage on welfare than the group with greater or less tenure in the program.

This indicates that at some time before the data were collected some families were enrolled who had characteristics different from those enrolled previously or later. Perhaps a push was made to enroll families and some who were not as disadvantaged were enrolled.

Adequacy of Diet Related To Tenure

The question of the improvement of the diet of the homemakers with continued participation in the program is of concern. Do their diets improve with tenure? Data are given in Table 11

TABLE 11
MEDIAM PERCENT RECOMMENDED DIETARY ALLOWANCE BY TENURE IN PROGRAM

Nutrient	East-West Gateway			Ozark Foothills		
	6-12 months	13-18 months	Over 18 months	6-12 months	13-18 months	Over months
Protein	143.5	147.0	134.0	190.0	160.5	155.5
Calcium	63.5	68.0	62.75	98.7	78.5	79.5
Iron	83.5	82.0	76.75	108.0	96.5	106.5
Vitamin A	73.5	74.25	77.0	83.0	78.5	72.0
Riboflavin	106.5	114.0	95.0	137.0	118.5	119.5
Vitamin C	109.5	90.75	134.0	74.0	85.5	88.0
Niacin	207.5	196.0	190.0	201.0	203.0	195.5
Thiamine	94.5	119.0	99.0	132.0	112.5	107.5

Regardless of program tenure, families in the East-West Gateway area consume protein and niacin in adequate amounts. If adequacy is defined at 67 percent of RDA, only calcium is consumed inadequately at any time. In the Ozark Foothills, all nutrients are consumed at at least 67 percent RDA regardless of program tenure.

Nutritional Adequacy

The percentage of families consuming 67 percent of RDA for all eight nutrients is presented by tenure in Table 12

TABLE 12
NUTRITION ADEQUACY AND TENURE IN PROGRAM

	East-West Gateway			Ozark Foothills		
	6-12 months	13-18 months	Over 18 months	6-12 months	13-18 months	Over 18 months
Adequate	44.74	28.95	33.33	47.37	25.00	43.75
Inadequate	55.26	71.05	66.67	52.63	75.00	56.25

A continuing increase in the percentages of families having an adquate diet was expected. Instead, a declining percent was noted.

Food Buying Skills and Nutrition Knowledge

Instead of looking strictly at dietary behavior as evidenced by the nutrients served, perhaps more attention should be placed on food buying skills and nutrition knowledge--the things that are actually taught by the NEA's. These data are given in Table 13.

TABLE 13
FOOD BUYING SKILLS AND NUTRITION KNOWLEDGE SCORE
AND TENURE IN PROGRAM

	East-West Gateway			Ozark Foothills		
	6-12 months	13-18 months	Over 18 months	6-12 months	13-18 months	Over 18 months
Food Buying Skills	2.947	2.921	2.828	2.632	2.938	2.875
Nutrition Knowledge	7.211	7.158	7.091	7.368	7.000	7.375

In the East-West Gateway unit a slight decrease was noted in food buying

skills and also nutrition knowledge. This suggests that the educational practice used with homemakers should be re-examined. Tenure had no effect on these scores in the Ozark Foothills.

These data raise some question about continued participation after eighteen months. The greatest increase in knowledge and skills as measured by our test, appear in the early part of the program. Technique and teaching methods used may not be appropriate for continued education in nutrition.

Frequency of Contact With Program Assistant

In making an evaluative judgement about an educational program, a variable that must be considered is the frequency of teacher-student contact. The teaching in the Expanded Food and Nutrition Education Program is done through two types of contact--individual visits and group visits.

Using the food buying and nutrition knowledge score as the dependent variable and frequency of contact as the independent variable, the data show highest scores were obtained with individual visits every other week, or group visits on a monthly basis. Data are given in Table 14.

TABLE 14
FOOD BUYING AND NUTRITION KNOWLEDGE SCORE BY FREQUENCY OF PROGRAM ASSISTANT'S VISITS TO PROGRAM FAMILIES*

Visits	Individual Visits	Group Visits
None	10.093	10.375
Less than monthly	10.353	10.294
Monthly	10.392	10.842
Every other week	11.125	9.400
Weekly	10.333	9.880

*In this table some homemakers reported only receiving individual visits and no group visits. Likewise there were homemakers reporting only group contact with program assistants.

The data show increasing scores for more frequent individual visit up to every other week. Increased contact provides more opppotunity for learning. Further investigation is needed to study the program assistant's log of the visit to determine the subjects taught and the planning that was done for instruction.

Likewise, the food buying and nutrition knowledge scores were highest for those having group visits monthly. More frequent group meetings do not result in increased scores. Further investigation is indicated to ascertain the cause of this phenomen.

Note: See appendix for chart of the cross tabulation of Food Buying and Nutrition Score by Individual Visits and by Group Visits.

SUMMARY AND IMPLICATIONS

A study of the Expanded Food and Nutrition Education Program in Missouri was undertaken to determine its effectiveness. Samples of program participants were drawn from urban areas, outstate areas and a very rural area. Comparable groups of homemakers were selected as a control group with which to measure progress. Effectiveness was measured in terms of family dietary adequacy.

In addition, program participant's dietary adequacy was examined in relation to homemaker and program characteristics. All program families studied had been in the program at least six months.

Following are the implications highlighted by the study:

1. Program families show a significantly higher score in food buying and nutrition knowledge than control families.

2. The adequacy of diets as measured by a three day food record indicated diets of program families not significantly different from those of control families.

3. The only characteristic significantly related to nutritional adequacy was homemaker level of education. This relationship was more important than income, race, age, participation in government food stamp and commodity food program or in public feeding programs.

4. The greatest increase in program related knowledge occurs in homemakers newly enrolled in the program. The benefits or continued increase in knowledge and skills after 18 months of participation appear to be minimal. The problem of progression of families to other educational programs needs development and expansion.

5. Most effective work with program families was indicated by individual visits every two weeks or monthly group visits. This can serve as a guide for program assistants planning their work.

6. The frequency of consumption of foods high in Vitamin A and Vitamin C was correlated significantly with frequency of individual and group visits in one unit. The program emphasis varies from unit to unit regarding nutrition problems.

7. The nutrients found to be consumed most inadequately are iron, calcium, vitamin A and Vitamin C. All of these scored below the Recommended Dietary Allowance for the families. These are the nutrients to be stressed in educational efforts of the Expanded Food and Nutrition Education Program.

The Expanded Food and Nutrition Education Program is making a significant impact on the nutrition educational level of its target audience.

Efforts can be improved and made more effective by stressing iron, calcium, vitamin A and vitamin C in the diet. Contact with the Program Assistants on an individual basis every two weeks and group contact once a month appear as recommendations. Progress after eighteen months of program participation appears questionable. Some form of progression or follow-up is needed to maintain the progress gained in the early months of enrollment in the program.

FOOTNOTES

[1]Citizens Board of Inquiry into Hunger and Malnutrition in the United States, Hunger U.S.A. (Boston: Beacon Press, 1968) p. 7.

[2]S. F. Adelson, "Changes in Diets of Households, 1955-1965," Journal of Home Economics, Volume 60 (1968), 448-455.

[3]Diets were rated as poor that provided less than two-thirds the allowance for one or more of these nutrients: protein, calcium, iron, vitamin A, thiamine, riboflavin, and ascorbic acid.

[4]Senator J. S. Clark, "Starvation in the Affluent Society," in A. I. Blaustein and R. R. Woock (eds.), Man Against Poverty: World War III. (New York: Vintage Books, 1965).

[5]Interdepartmental Committee on Nutrition for National Defense, Manual for Nutrition Surveys (Bethesda, Maryland: National Institutes of Health, 1963), p. 174.

[6]Chalmers has said, "There has also been debate as to the need for obtaining data concerning nutrient intake on Saturdays, Sundays, and holidays. It is the general opinion of many research workers that eating habits of certain population groups tend to very considerably on Sundays and other holidays." However, research done by Chalmers and other research reported by Morgan indicates that there is no real difference in the nutrient intake of a given person between days. A possible exception to this is college students who tend to eat less on weekends.

[7]F. W. Chalmers, "The Dietary Record - How Many and Which Days," Journal of the American Dietetic Association, Volume 28, No. 8 (August, 1952), 711.

[8]Ibid, p. 712

[9]C. M. Young, et al., "Weekly Variation in Nutrient Intake of Young Adults," Journal of the American Dietetic Association, Volume 29, No. 5 (May 1953), 463.

[10]E. Reh, Manual on Household Food Consumption Surveys (Rome: Food and Agriculture Organization of the United Nations, 1962), p. 87.

[11]C. M. Young, et al., "What the Homemaker Knows About Nutrition - Relation of Knowledge to Practice," Journal of the American Dietetic Association, Volume 32, No. 4 (April 1956), 323.

[12]D. Sanjur and A. D. Scoma, "Food Habits of Low Income Children in Northern New York," Journal of Nutrition Education, Volume 2, No. 3 (Winter 1971, 85-95.

[13]H. B. Bylund, Social and Psychological Factors Associated with the Acceptance of New Food Products, The Pennsylvania State University, College of Agriculture, Agricultural Experiment Station, Bulletin No. 708, December 1963, University Park, Pennsylvania, p. 8.

[14]T. R. A. Davis, S. N. Gershoff and D. F. Gamble, "Review of Studies of Vitamin and Mineral Nutrition in the United States - 1950-1968," Journal of Nutrition Education, Volume 1, No. 2, Supplement 1 (Fall 1969), 47.

[15]Bylund, p. 7.

[16]Citizens Board of Inquiry into Hunger and Malnutrition in the United States, Hunger U.S.A. Revisted, published in cooperation with the National Council on Hunger and Malnutrition and the Southern Regional Council, 1972.

[17]J. P. Madden and M. D. Yoder, Program Evaluation: Food Stamps and Commodity Distribution in Rural Areas of Central Pennsylvania, The Pennsylvania State University, College of Agriculture, Agriculture Experiment Station Bulletin 780, June 1972, University Park, Pennsylvania.

[18]J. G. Feaster, Impact of the Expanded Food and Nutrition Education Program on Low Income Families: An In-Depth Analysis, Agricultural Economic Report No. 220, U. S. Department of Agriculture, Economic Research Service, February 1972, Washington, D. C.

[19]Madden and Yoder, p. 13

[20]Feaster, p. 3.

[21]Synectics Corporation, Program Performance 1971 Expanded Food and Nutrition Education Program, United States Department of Agriculture, Extension Service, May 1971.

[22]P. A. Stefanik and M. F. Trulson, "Determining the Frequency Intakes of Foods in Large Group Studies," The American Journal of Clinical Nutrition, Volume 11, No. 5 (November 1962), 335.

[23]Ibid, p. 338.

[24]R. W. Thomas, et al., "Rapid Method for Qualitative Appraisal of Food Intakes of Groups," Journal of the American Dietetic Association, Volume 30, No. 9 (September, 1964) 865-871.

[25]J. L. Kelsey, "A Compendium of Nutritional Status Studies and Dietary Evaluation Studies Conducted in the United States, 1957-1967," The Journal of Nutrition, Supplement 1, Part 2, Volume 99, No. 1 (September 1969), 133.

[26]Davis, Gershoff and Gamble, p. 41-57.

[27]Feaster, Impact of the Expanded Food and Nutrition Education Program on Low Income Families: An In-Depth Analysis.

[28]Data used to convert household measures of food into grams of edible foods included:

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Consumer and Food Economics Research Division, ARS, (Revised August 1970, slightly revised January 1971).

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R. M. Leverton and George V. Odell, Nutritive Value of Cooked Meat, Miscellaneous Publications MP 49, (June 1959).

USDA, Food Yields Summarized by Different Stages of Preparation, Agriculture Handbook No. 102, ARS, (Government Printing Office, June 1956).

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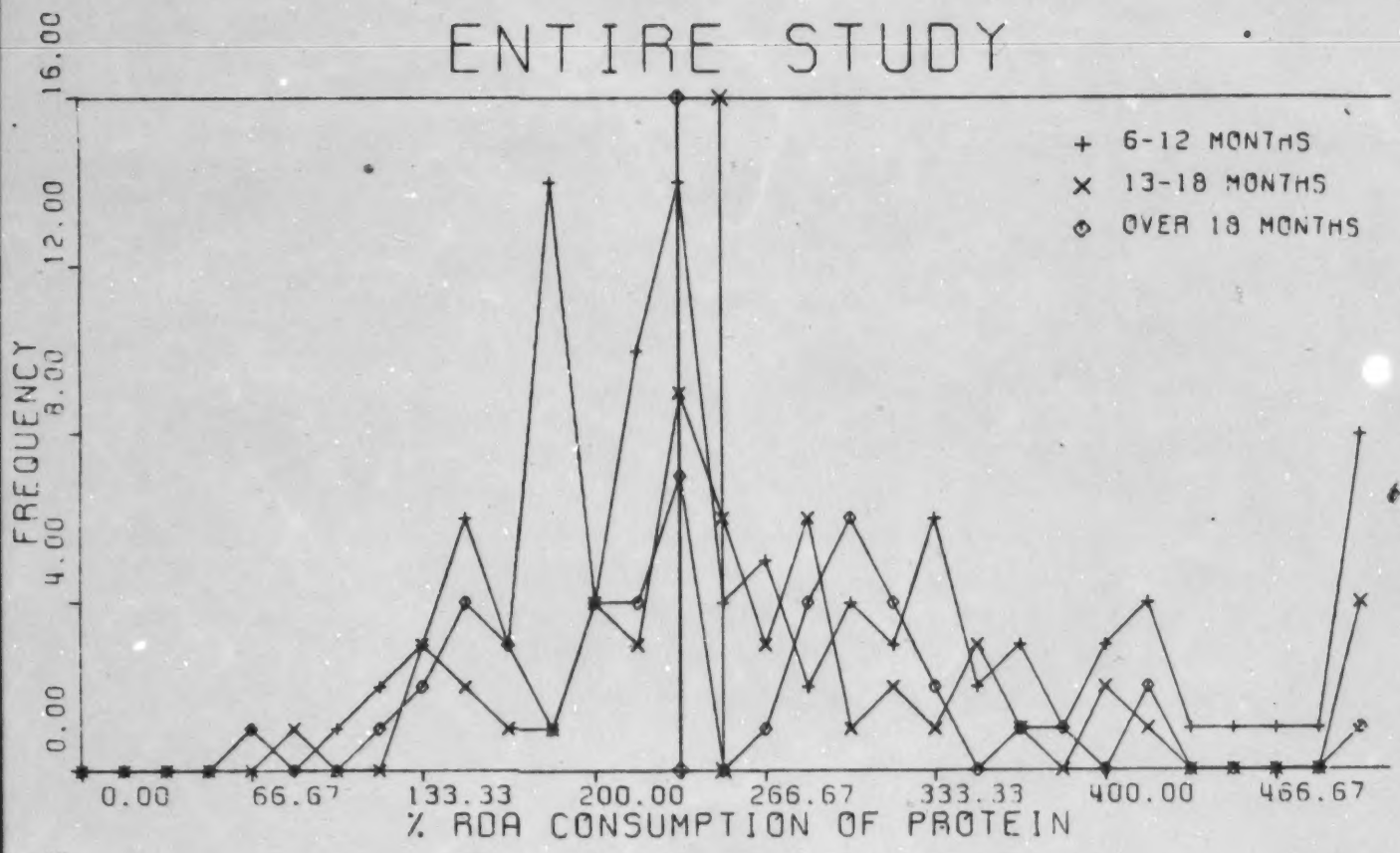
APPENDIX A

Charts of Recommended Dietary Allowances

The following charts report the percent recommended dietary allowance reported for each group. The data is grouped and plotted on a 16.67 percent interval on the horizontal axis. The charts were drawn by the computer. The computer has drawn the median for each group.

Tables are given for eight nutrients for the entire study and for each of the locations where the data were gathered.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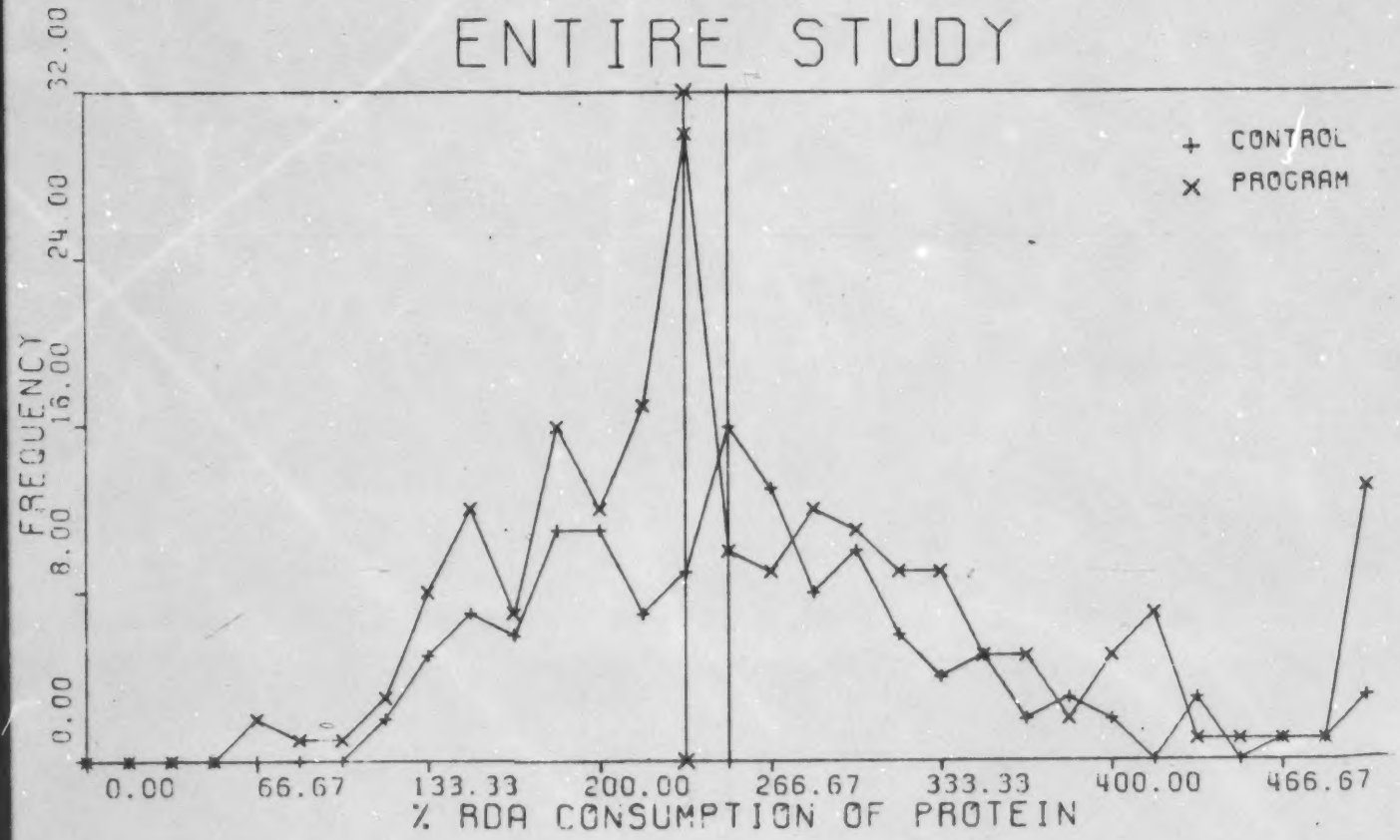
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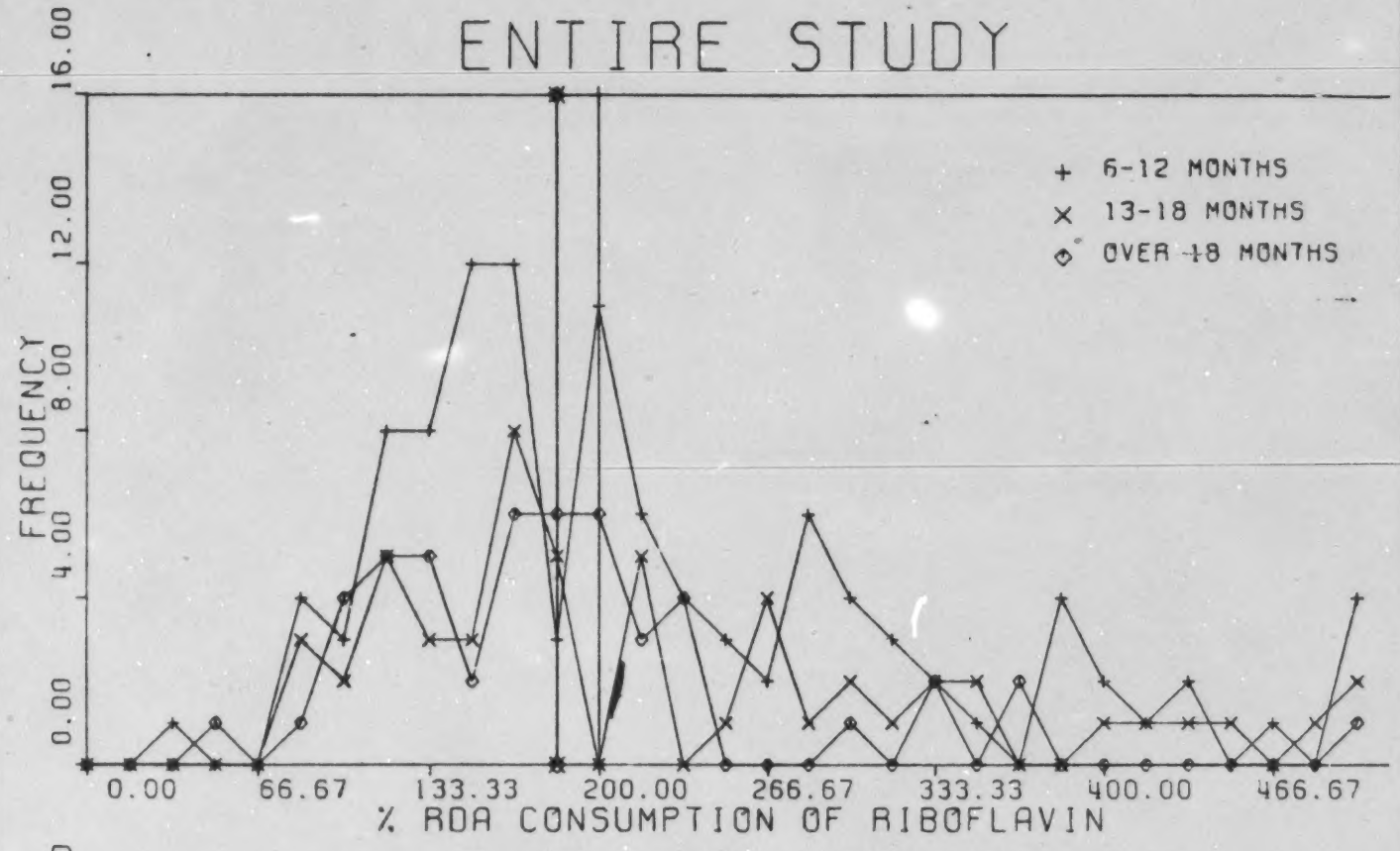
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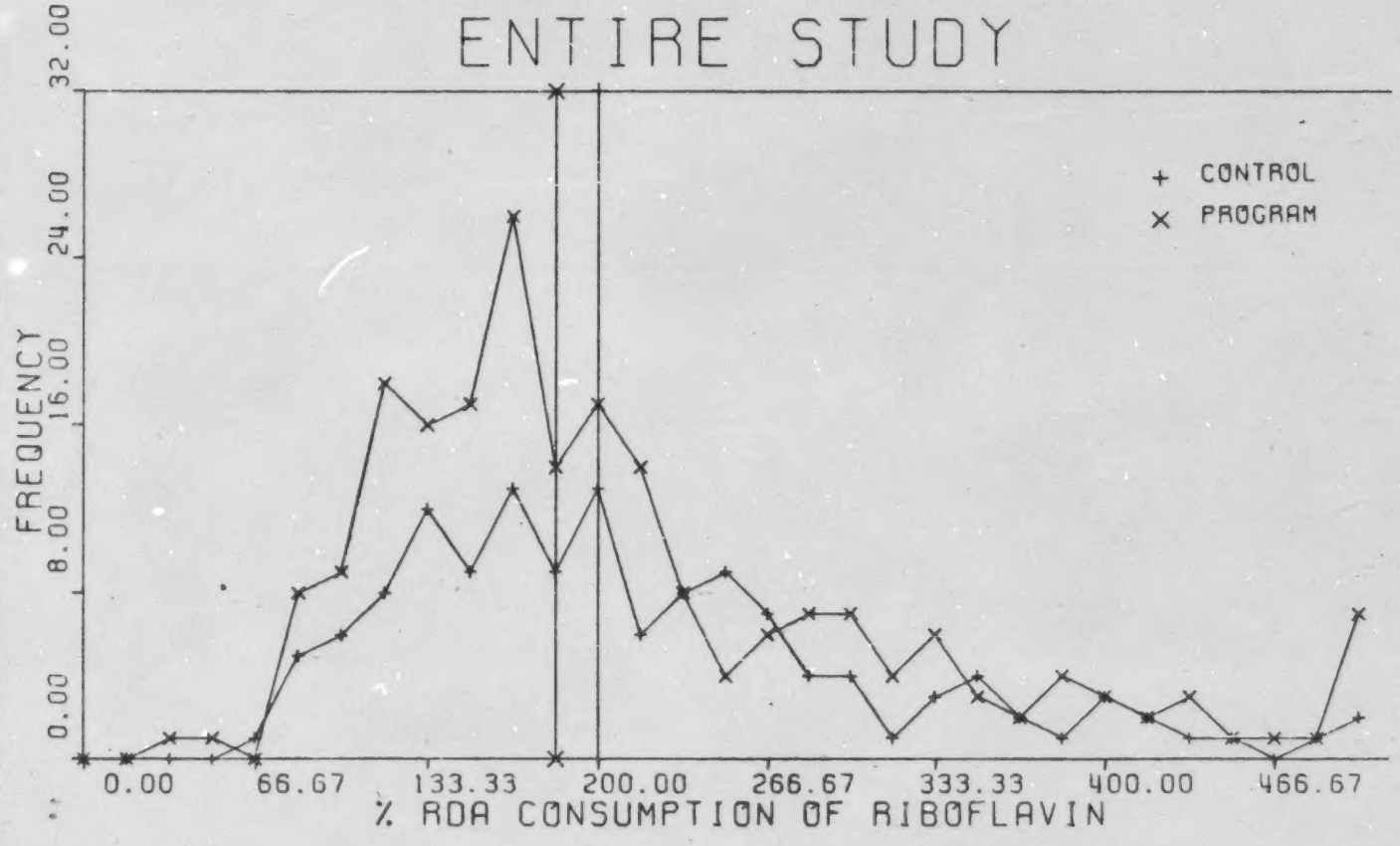
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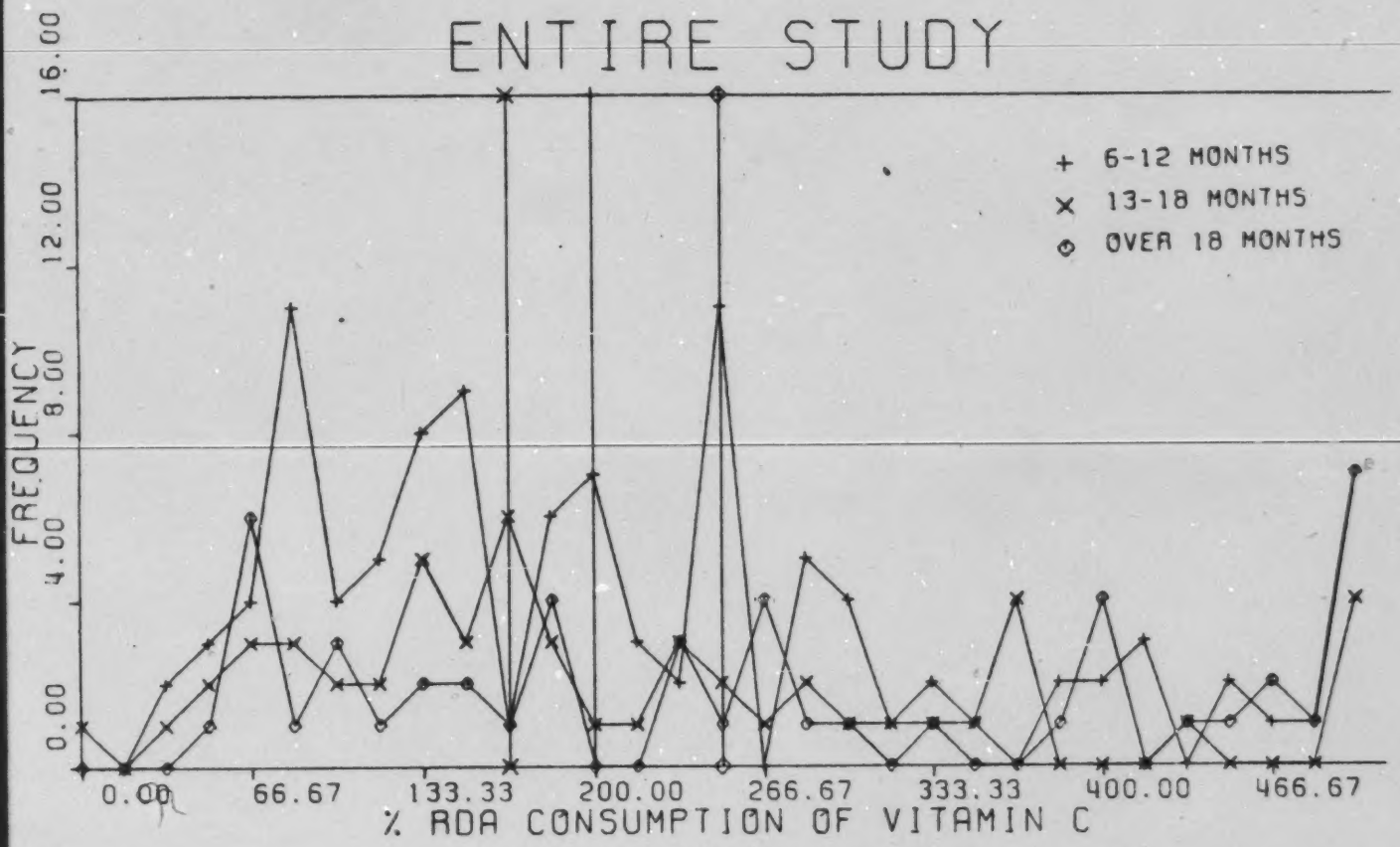
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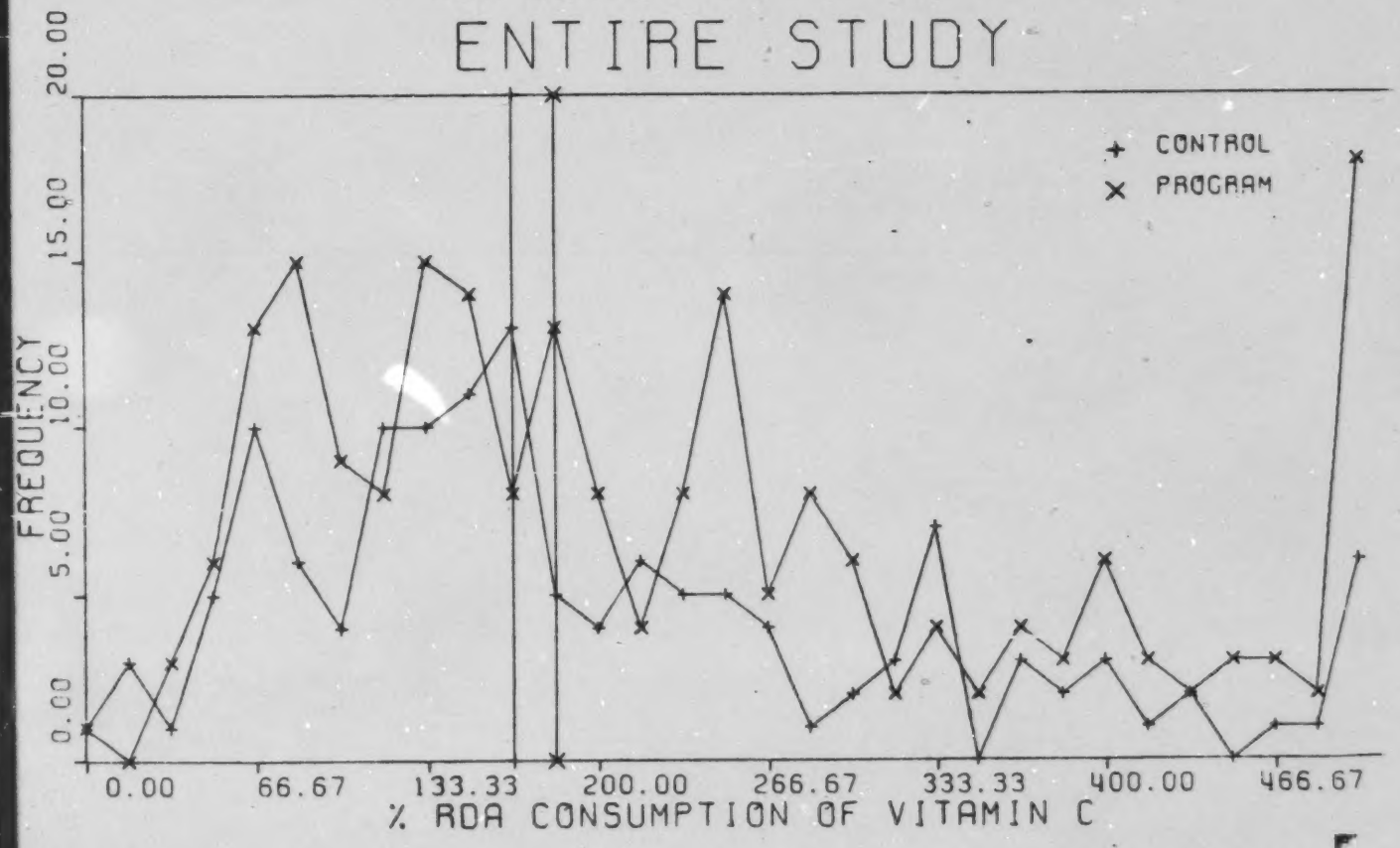
% RDA CONSUMPTION OF VITAMIN C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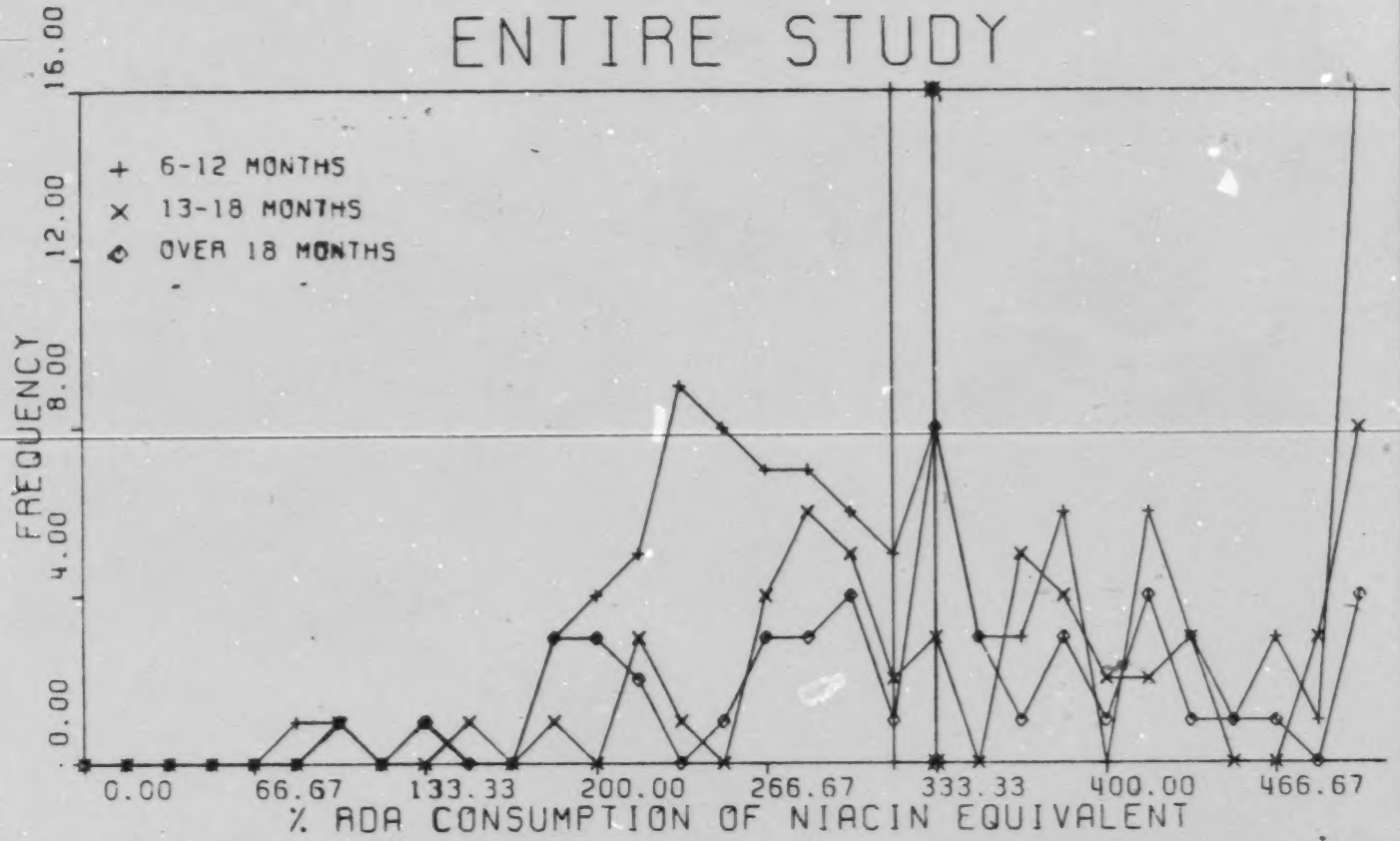
% RDA CONSUMPTION OF VITAMIN C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+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
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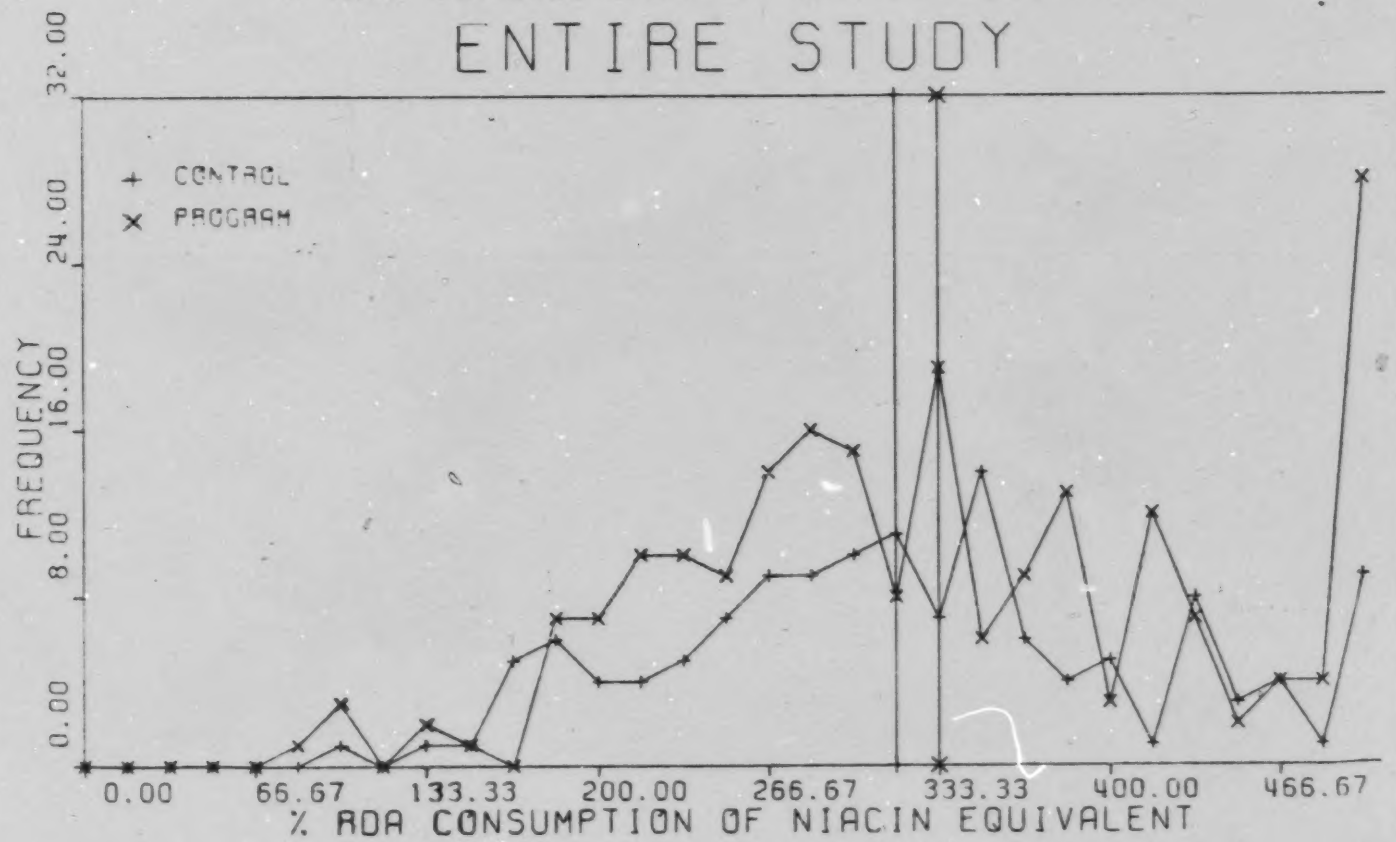
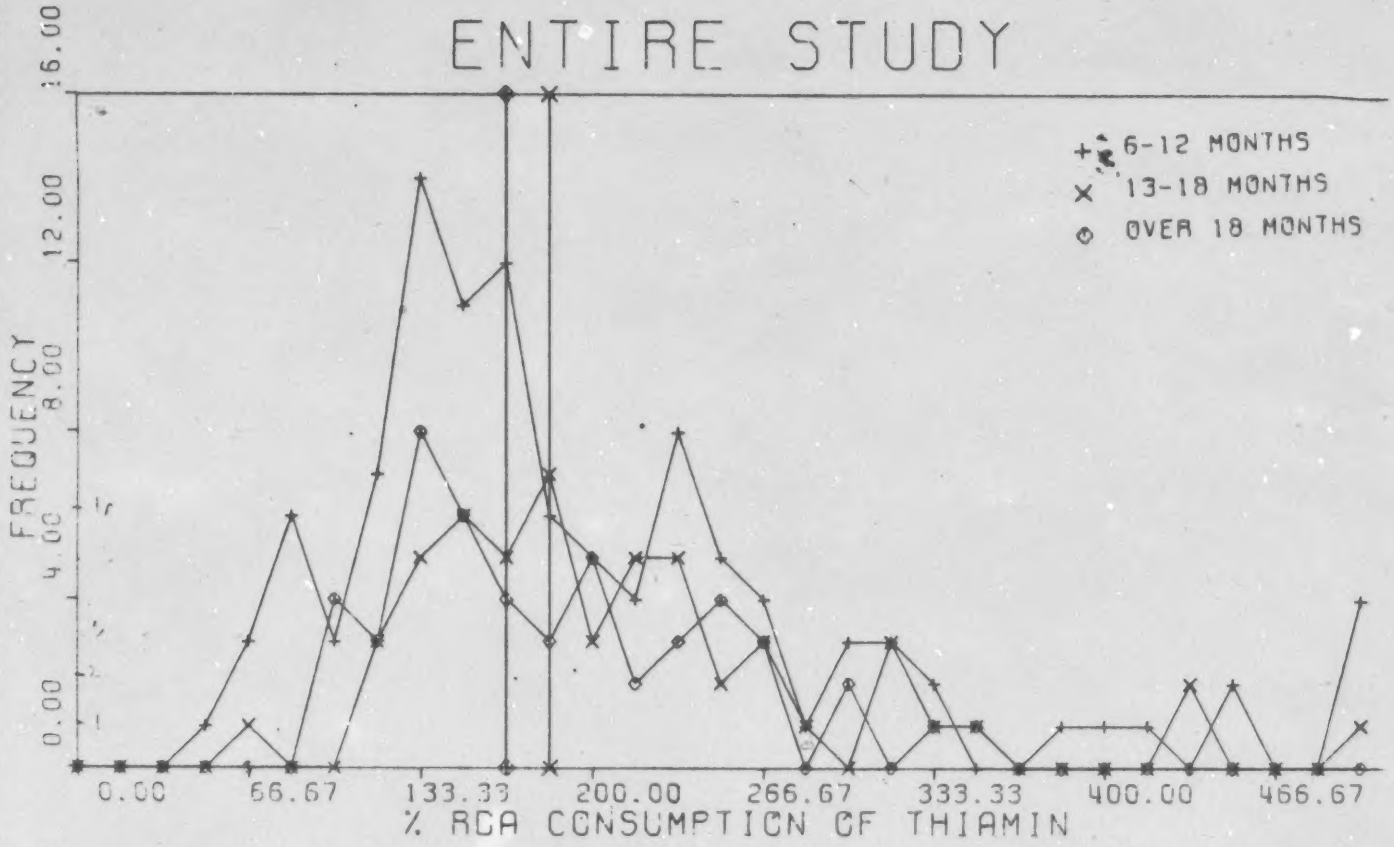
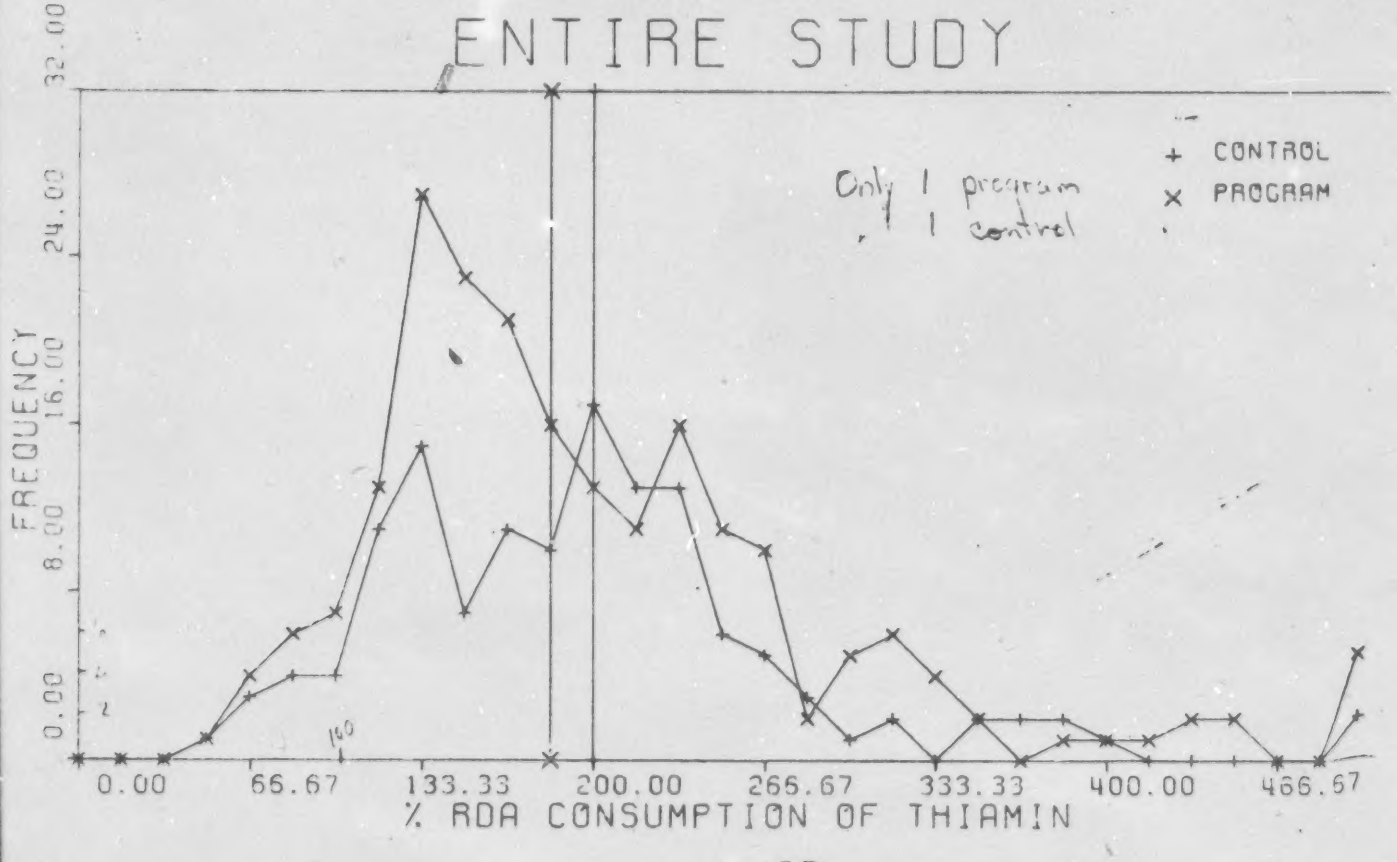
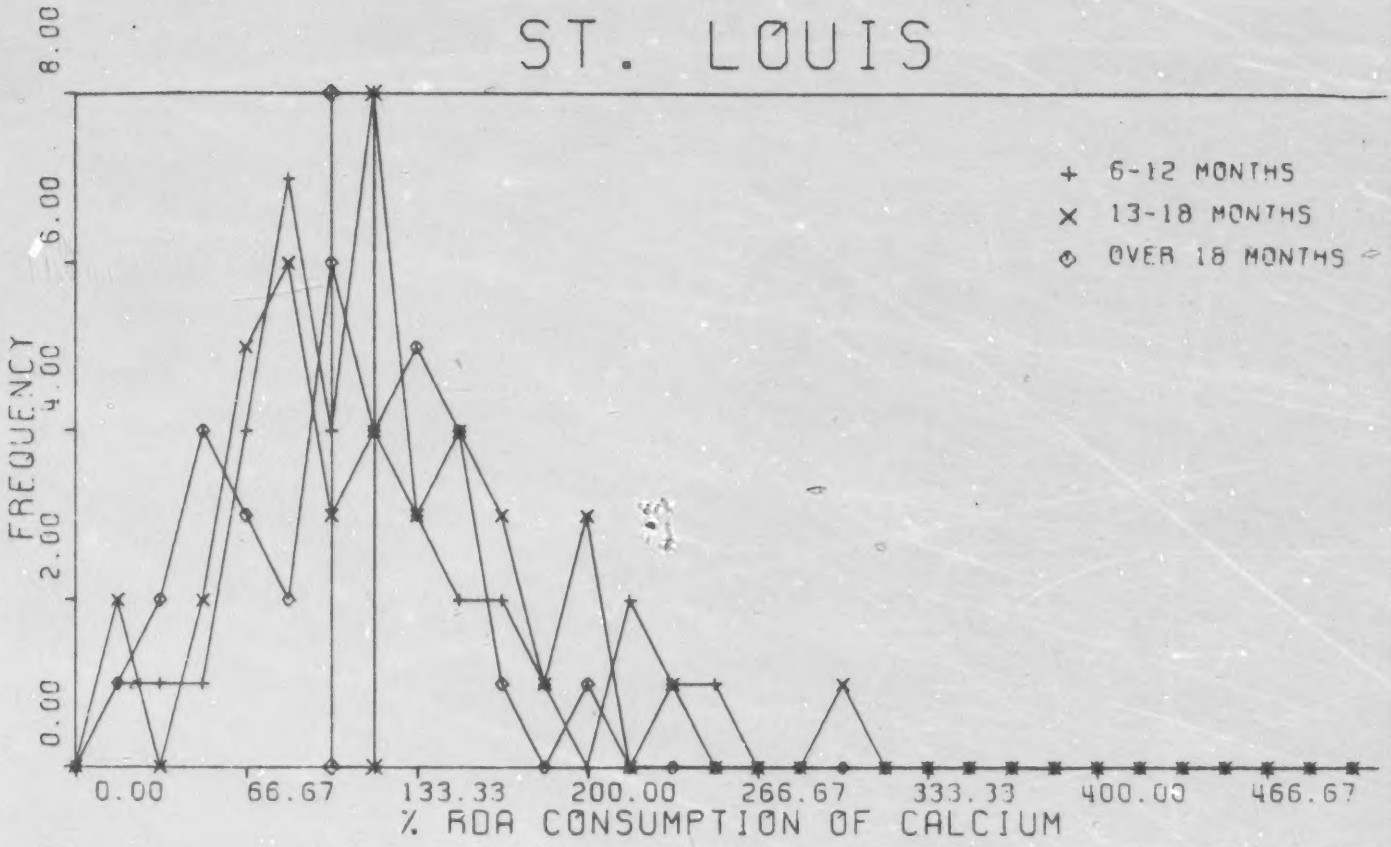
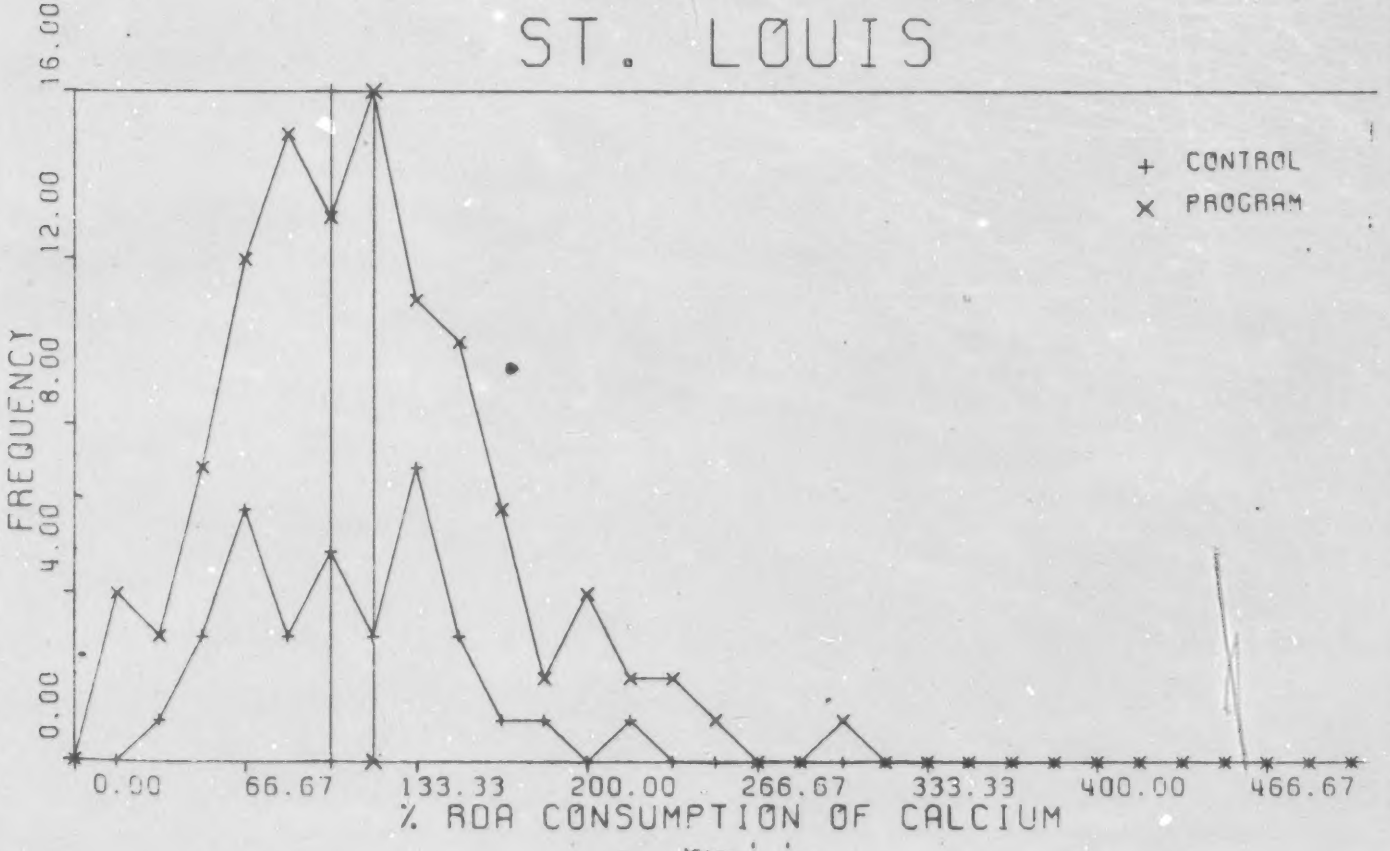
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF NIACIN EQUIVALENT

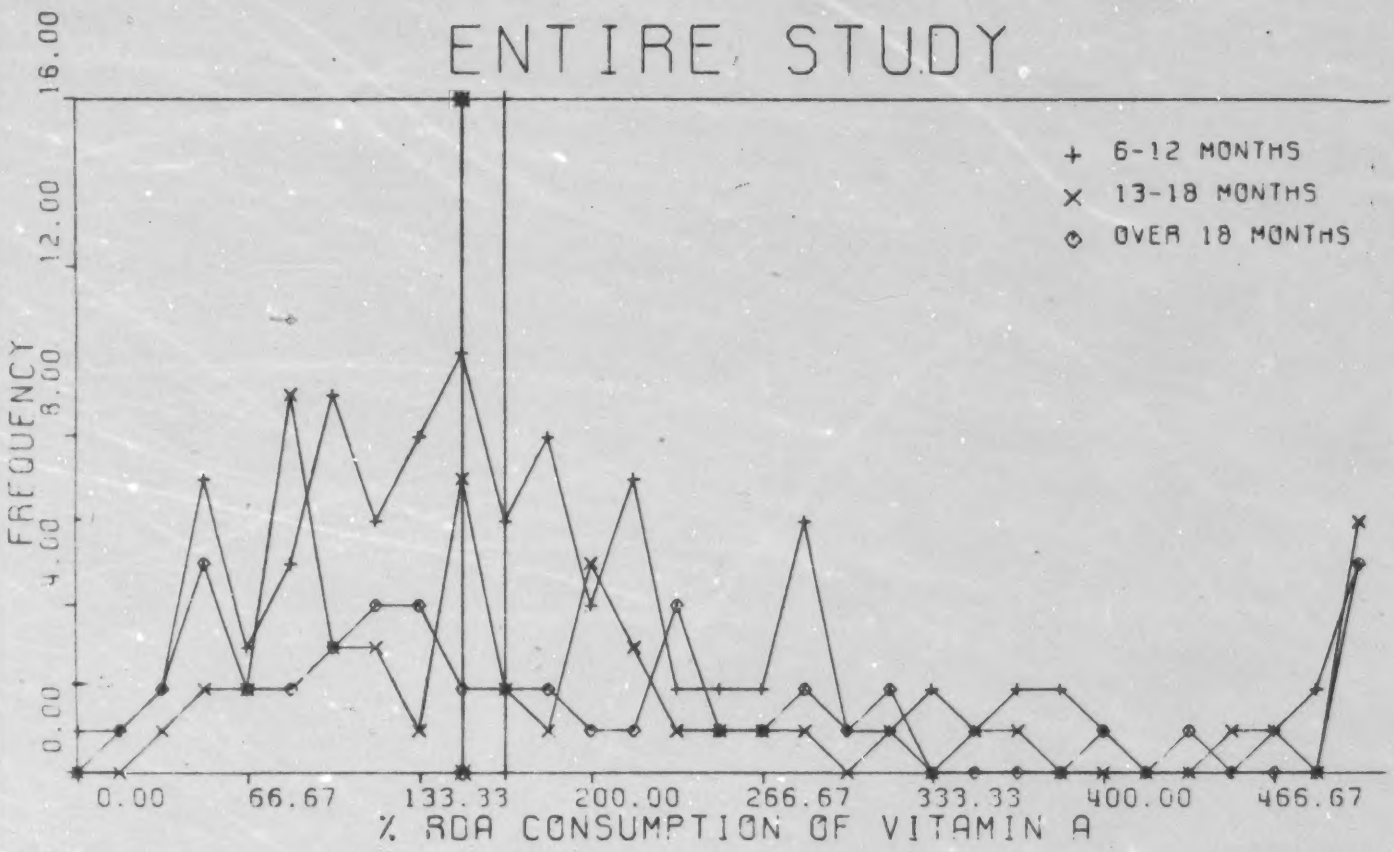

ENTIRE STUDY
+ CONTROL
× PROGRAM
FREQUENCY
0.00
8.00
16.00
24.00
32.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF NIACIN EQUIVALENT

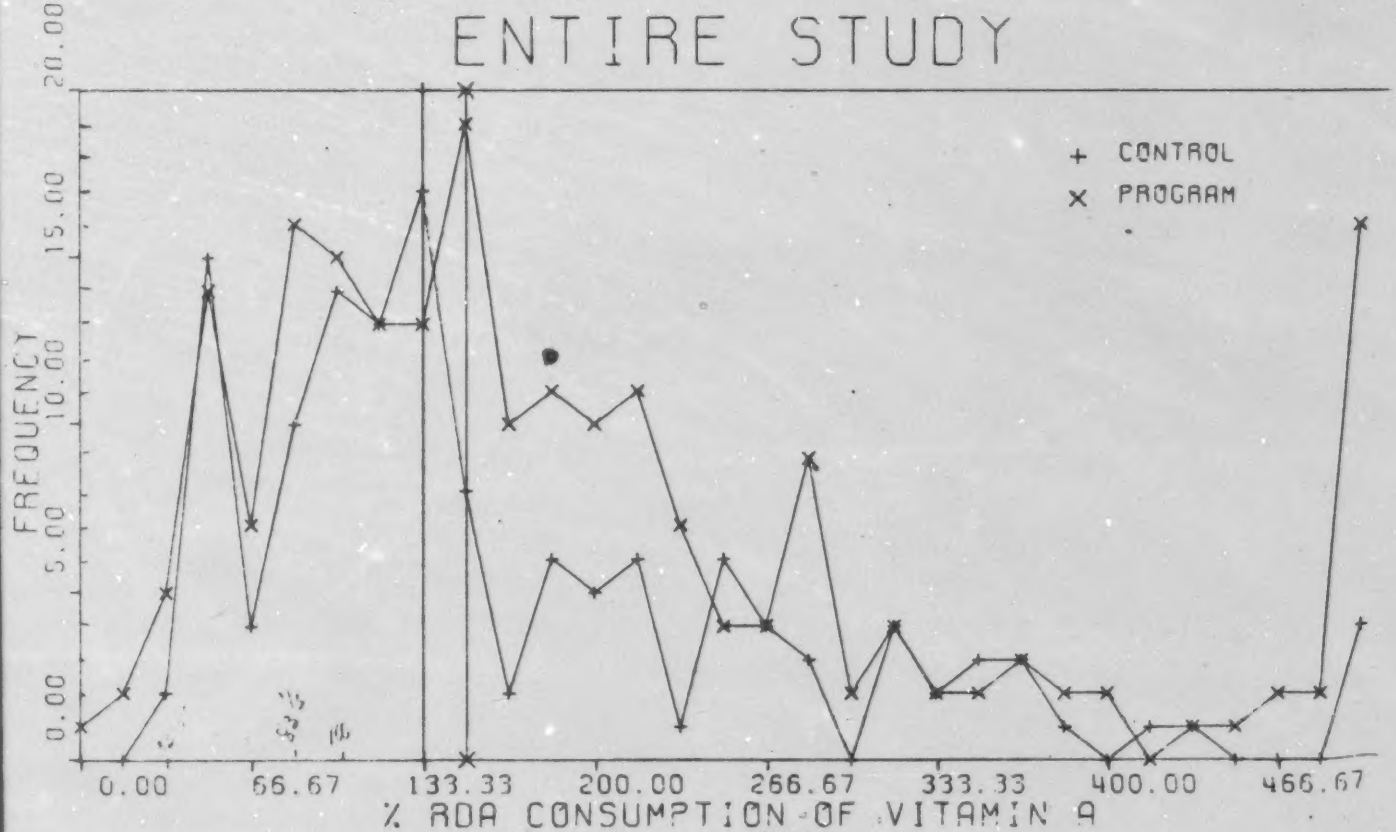

ENTIRE STUDY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
FREQUENCY
16.00
12.00
8.00
4.00
0.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF THIAMIN

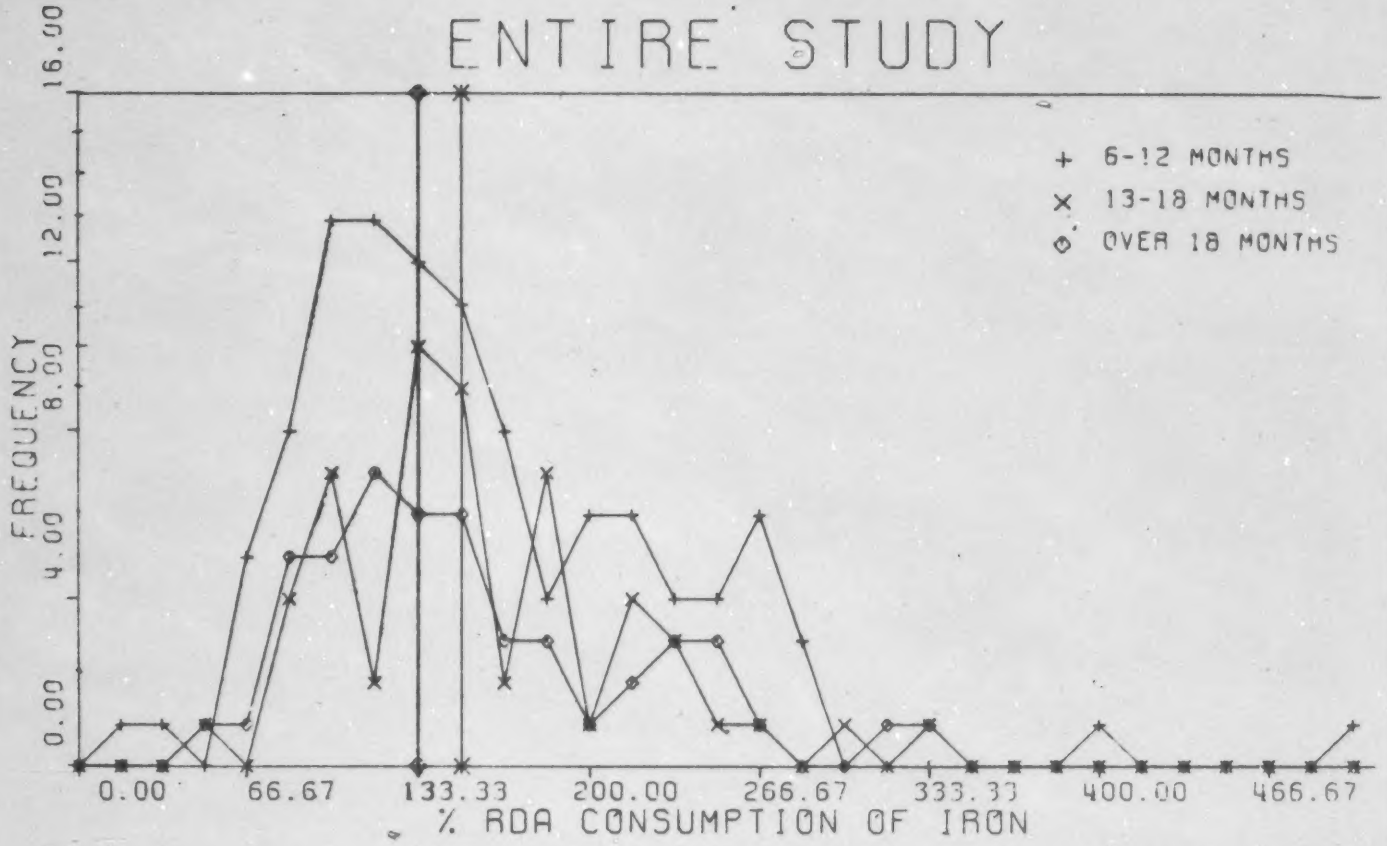

ENTIRE STUDY
+ CONTROL
× PROGRAM
Only 1 program
1 control
FREQUENCY
32.00
24.00
16.00
8.00
0.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF THIAMIN

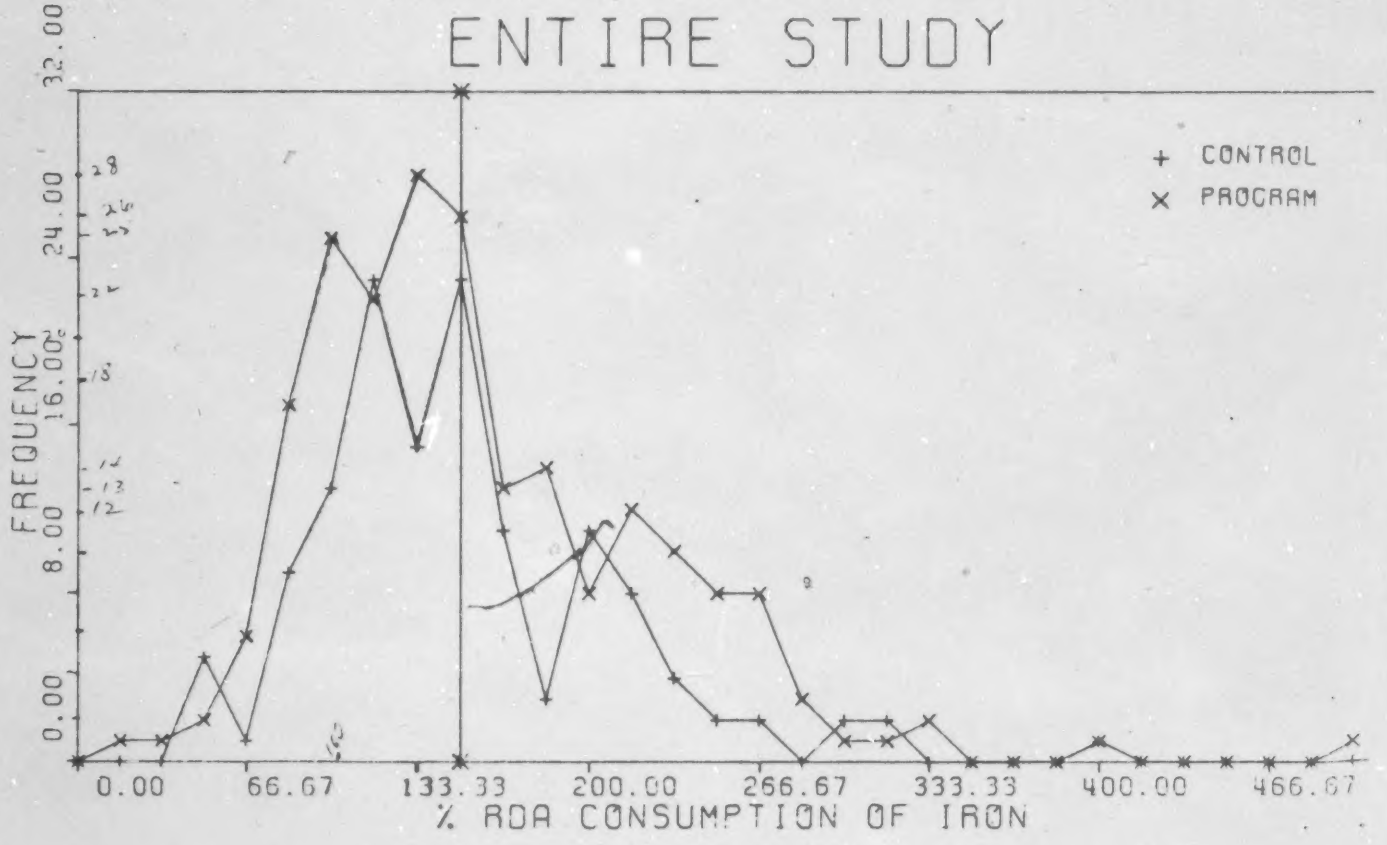

ST. LOUIS
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
FREQUENCY
0.00
2.00
4.00
6.00
8.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF CALCIUM

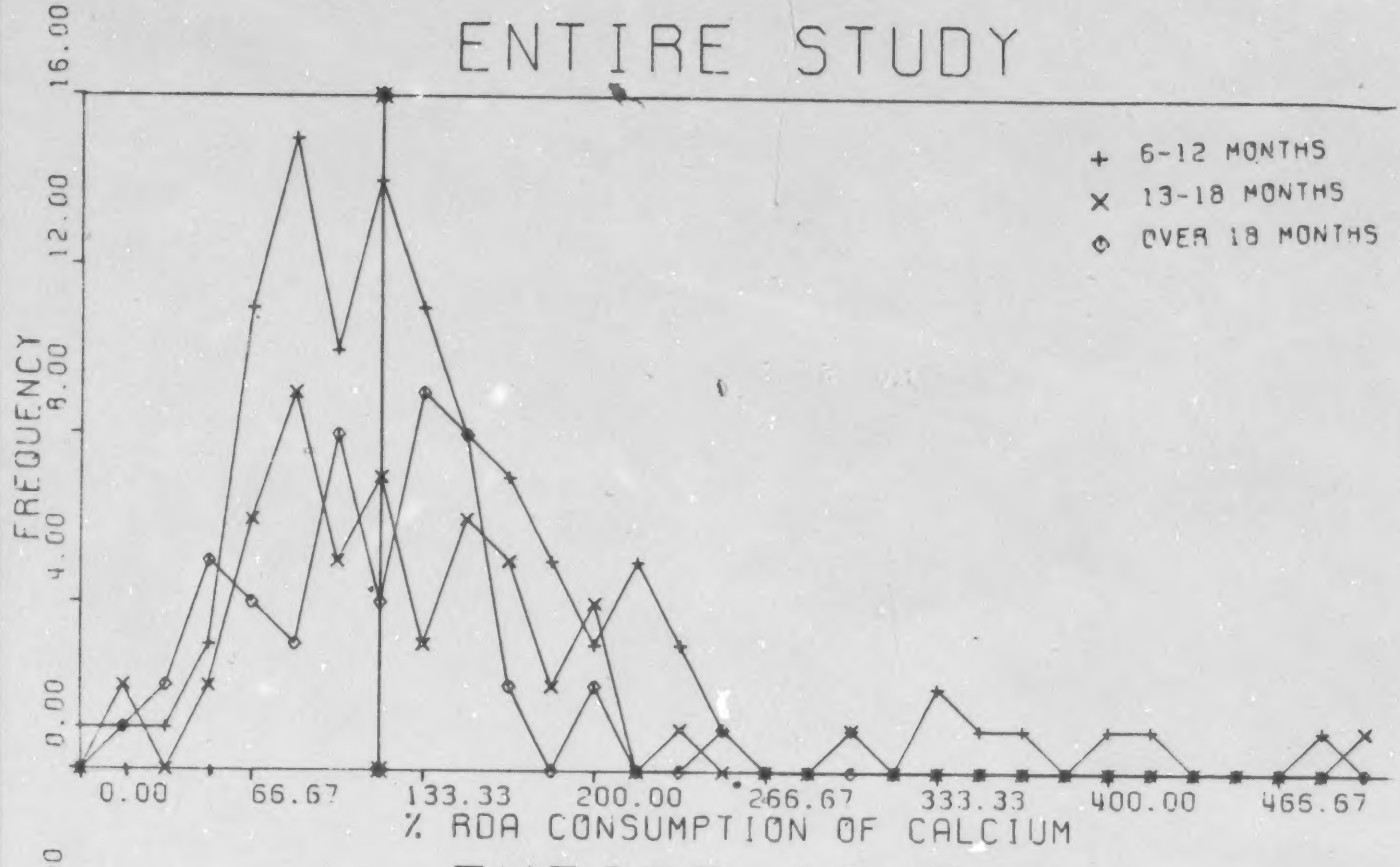

ST. LOUIS
+ CONTROL
× PROGRAM
FREQUENCY
0.00
4.00
8.00
12.00
16.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF CALCIUM

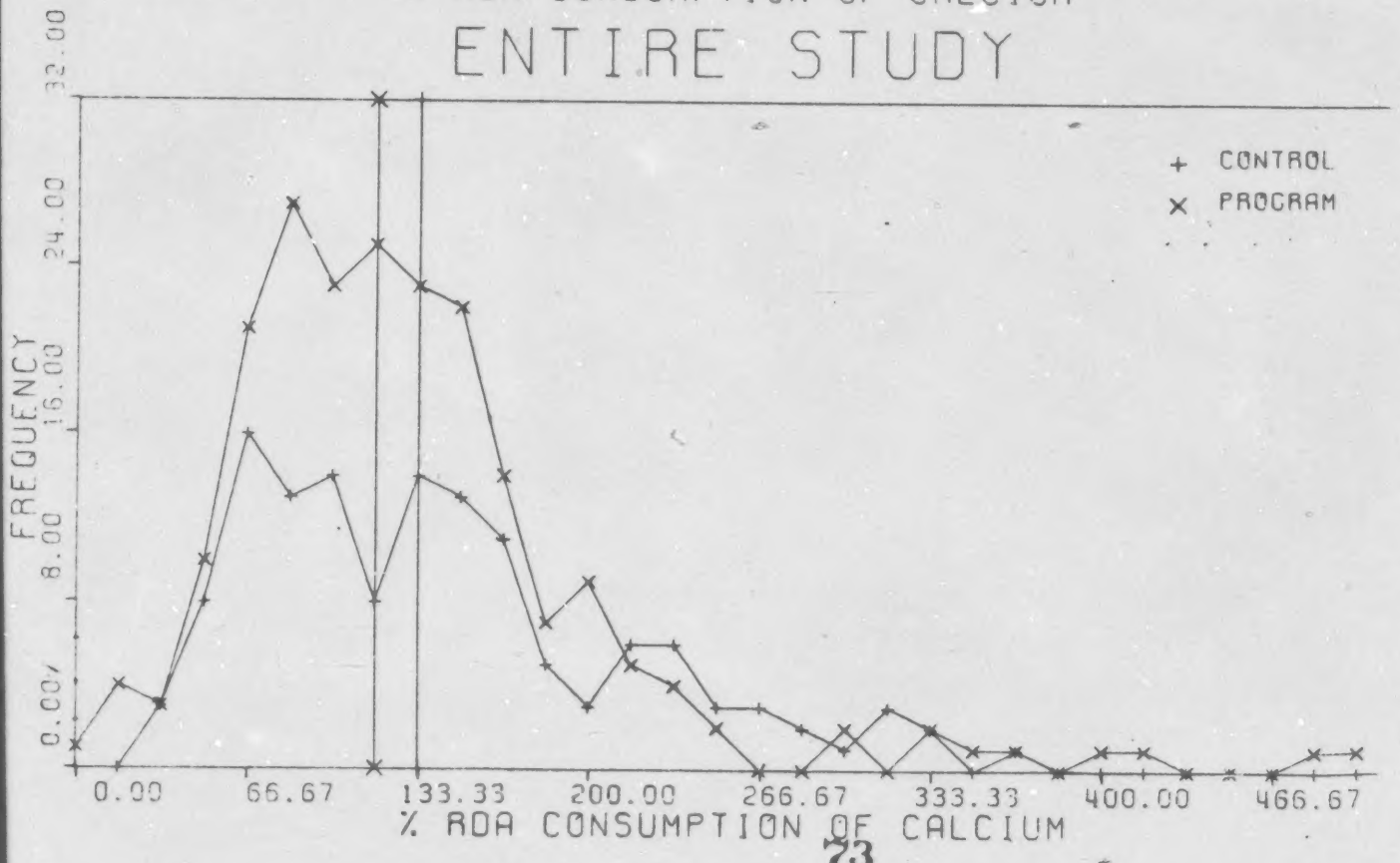

ENTIRE STUDY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
FREQUENCY
0.00
4.00
8.00
12.00
16.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF VITAMIN A

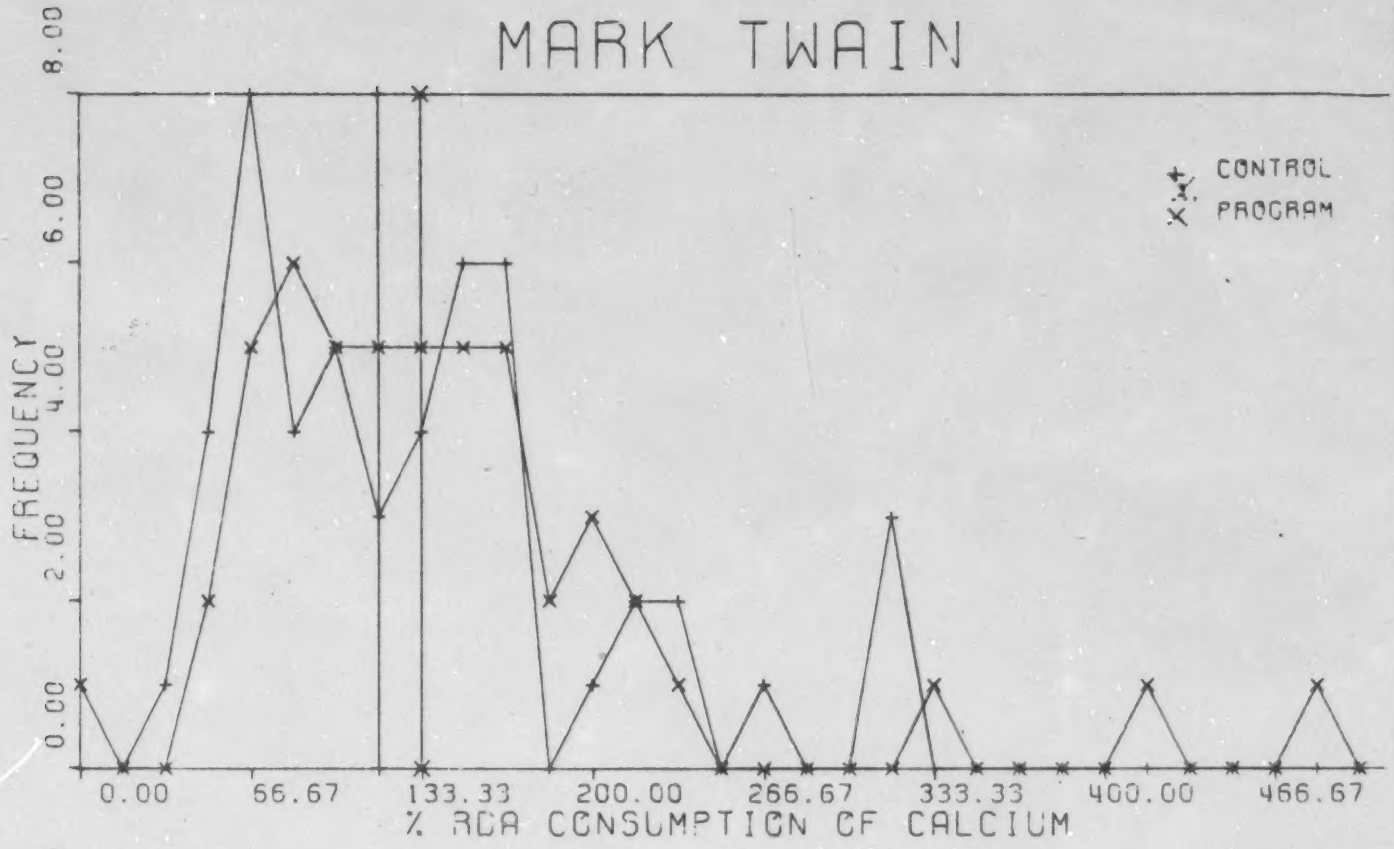

ENTIRE STUDY
+ CONTROL
× PROGRAM
FREQUENCY
0.00
5.00
10.00
15.00
20.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF VITAMIN A

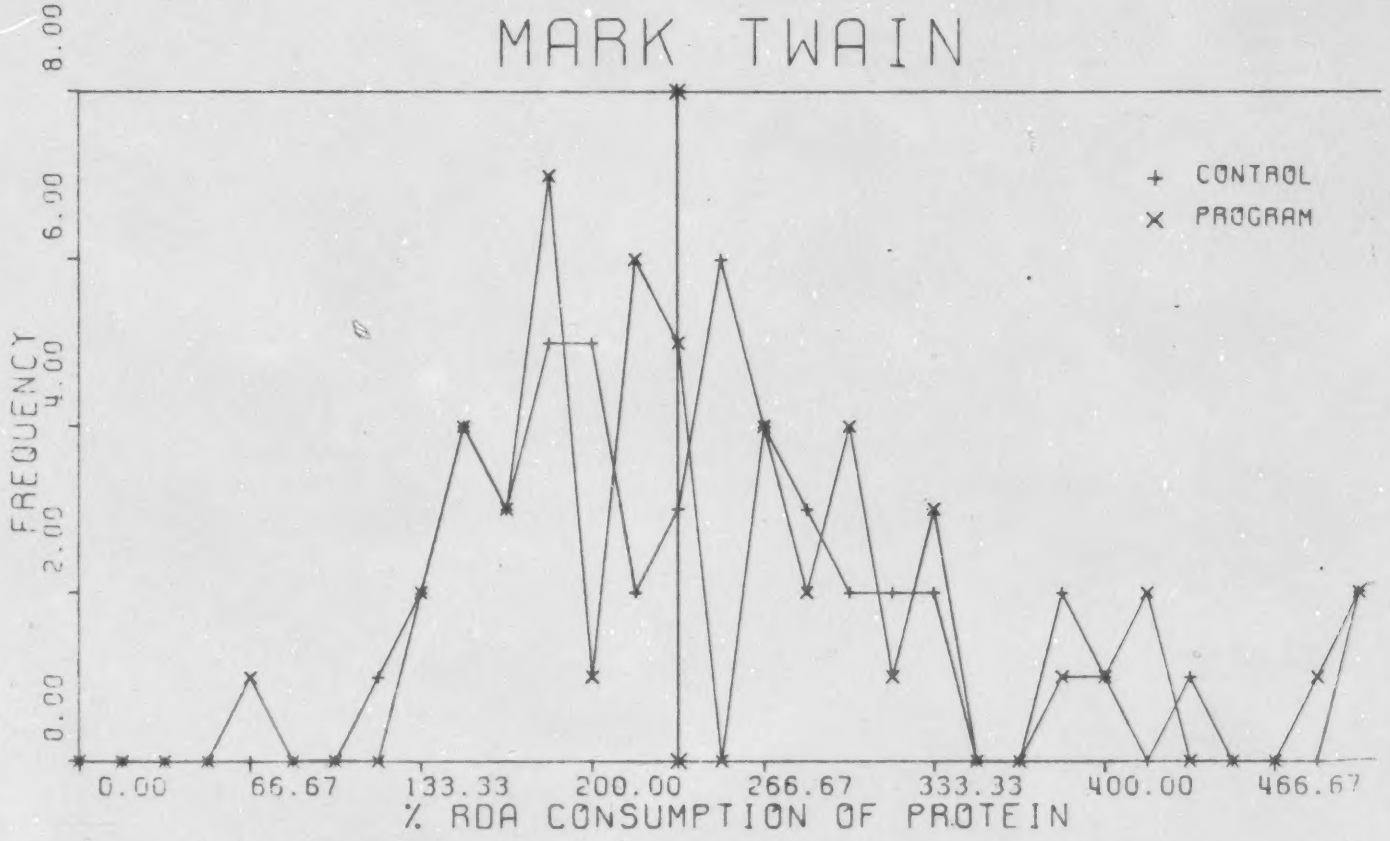

ENTIRE STUDY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
FREQUENCY
16.00
12.00
8.00
4.00
0.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF IRON

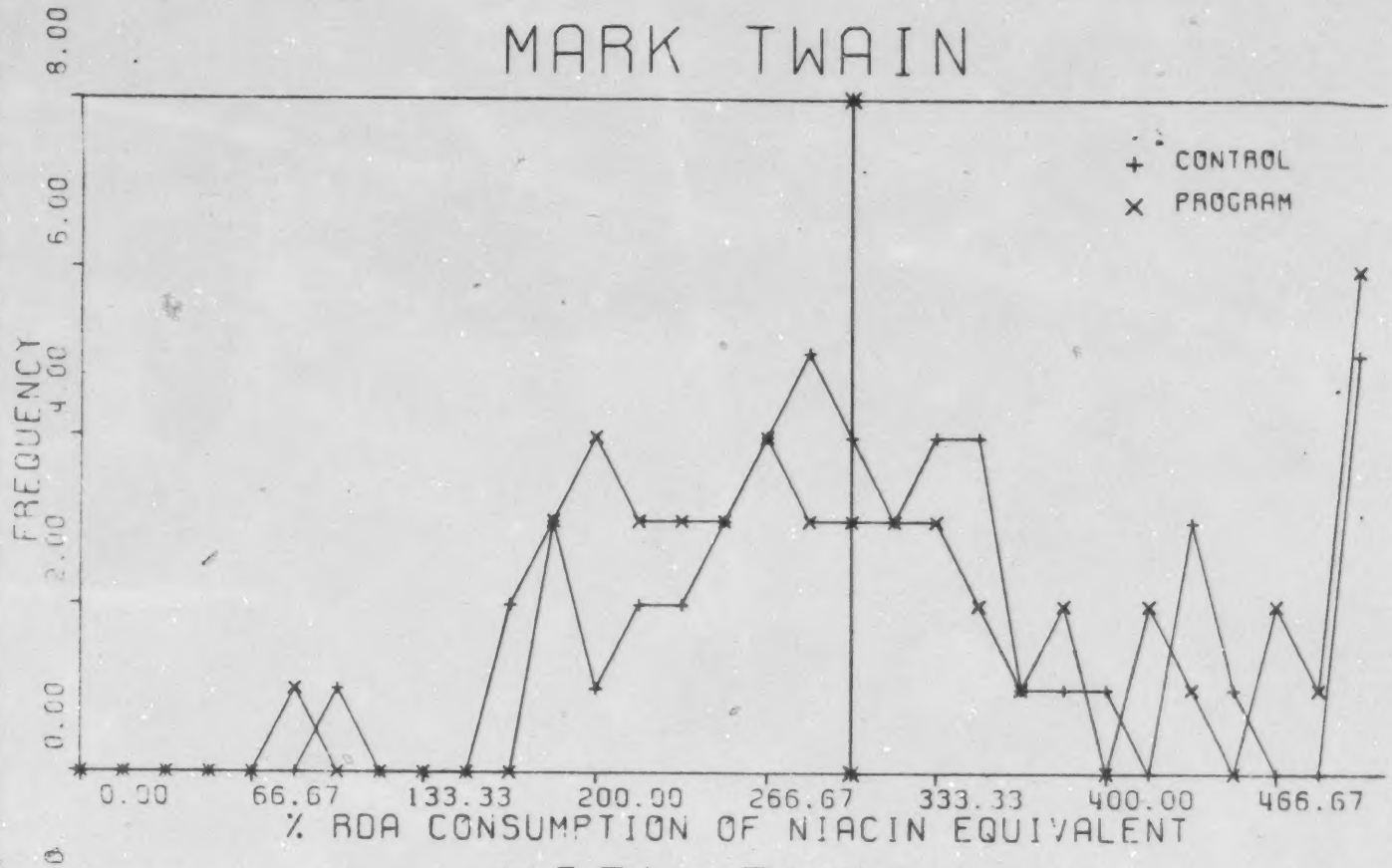

ENTIRE STUDY
+ CONTROL
× PROGRAM
FREQUENCY
32.00
24.00
16.00
8.00
0.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF IRON

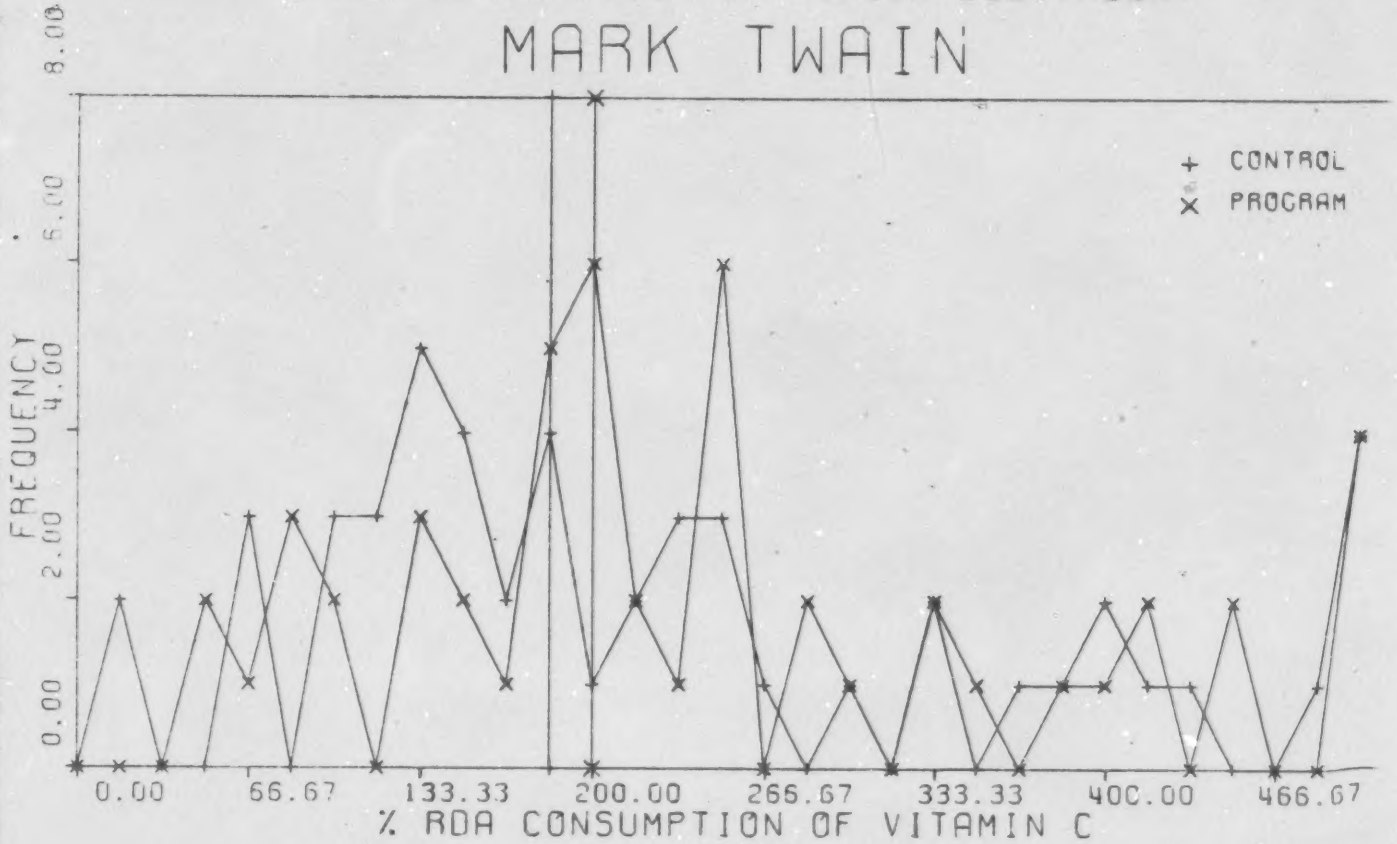

ENTIRE STUDY
FREQUENCY
16.00
12.00
8.00
4.00
0.00
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF CALCIUM

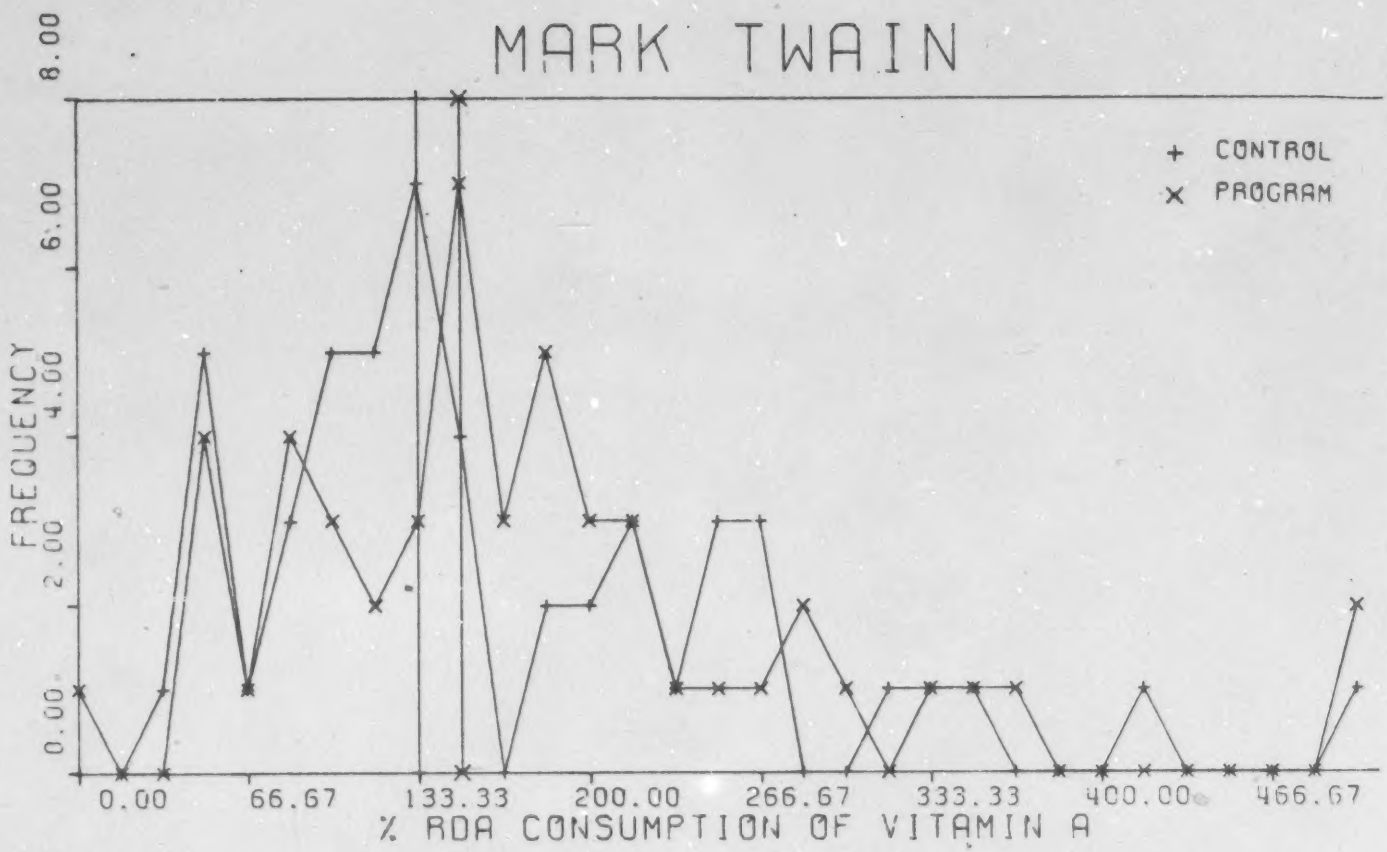

ENTIRE STUDY
FREQUENCY
32.00
24.00
16.00
8.00
0.00
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF CALCIUM

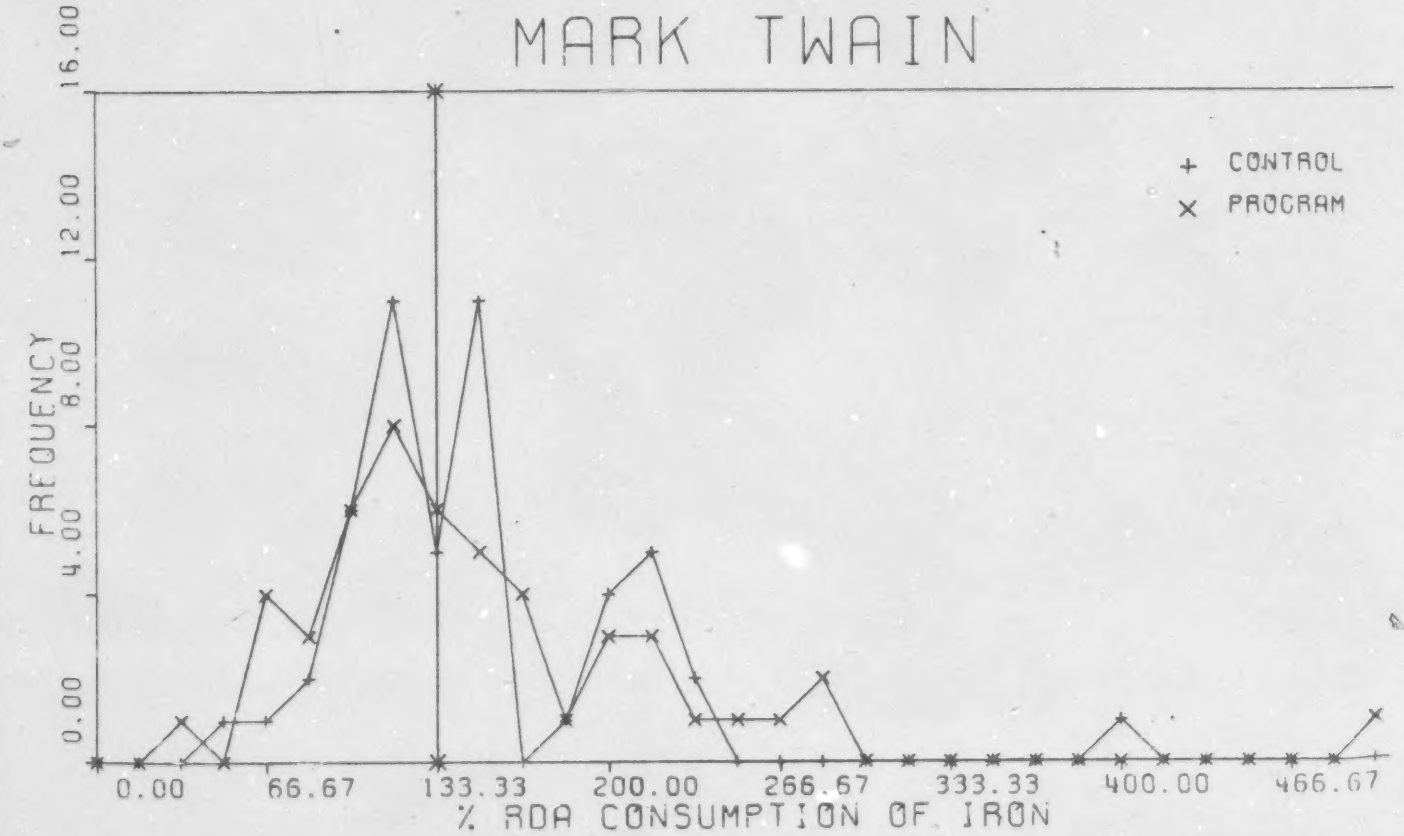

MARK TWAIN
8.00
6.00
4.00
2.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF CALCIUM

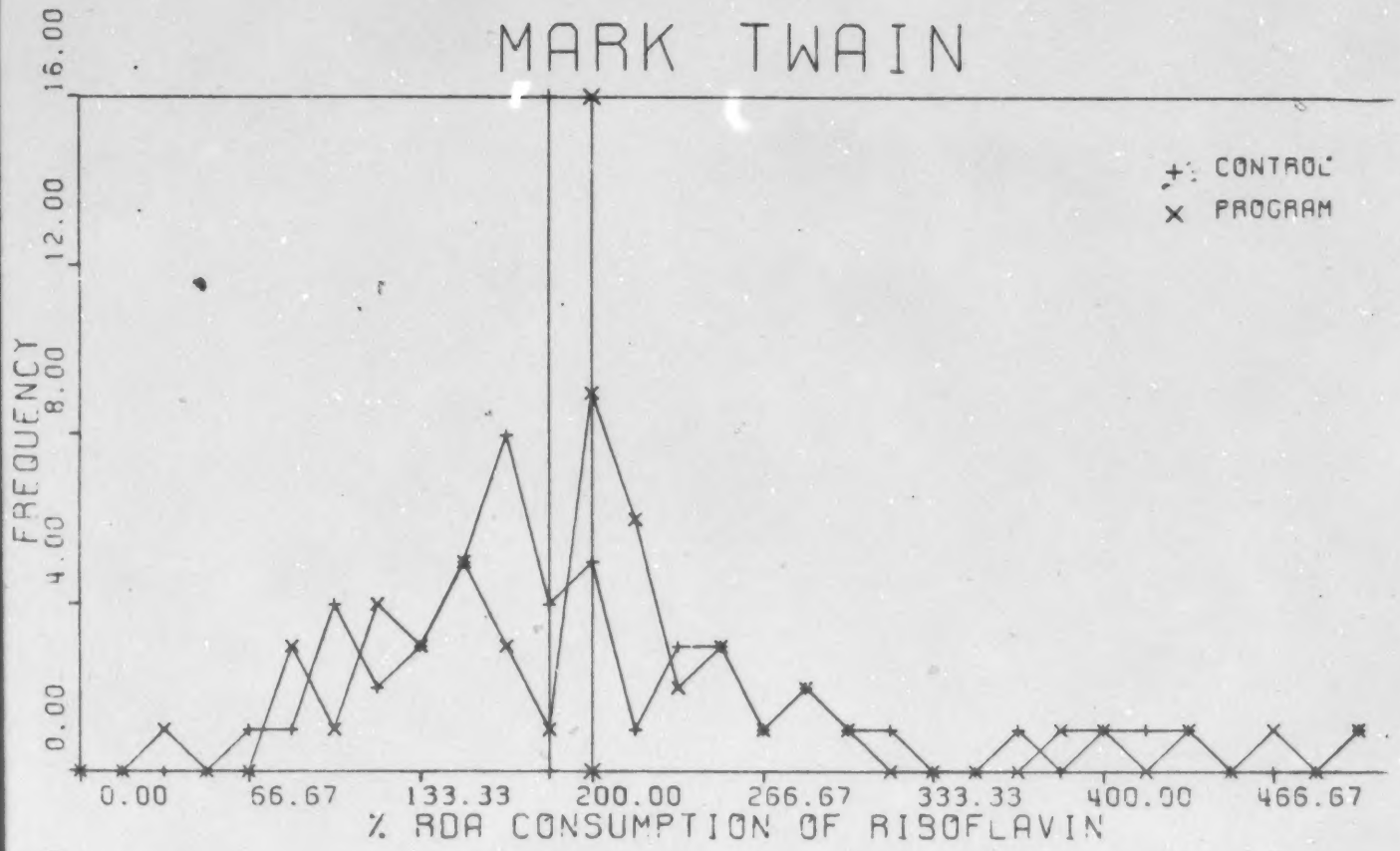

MARK TWAIN
8.00
6.00
4.00
2.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF PROTEIN

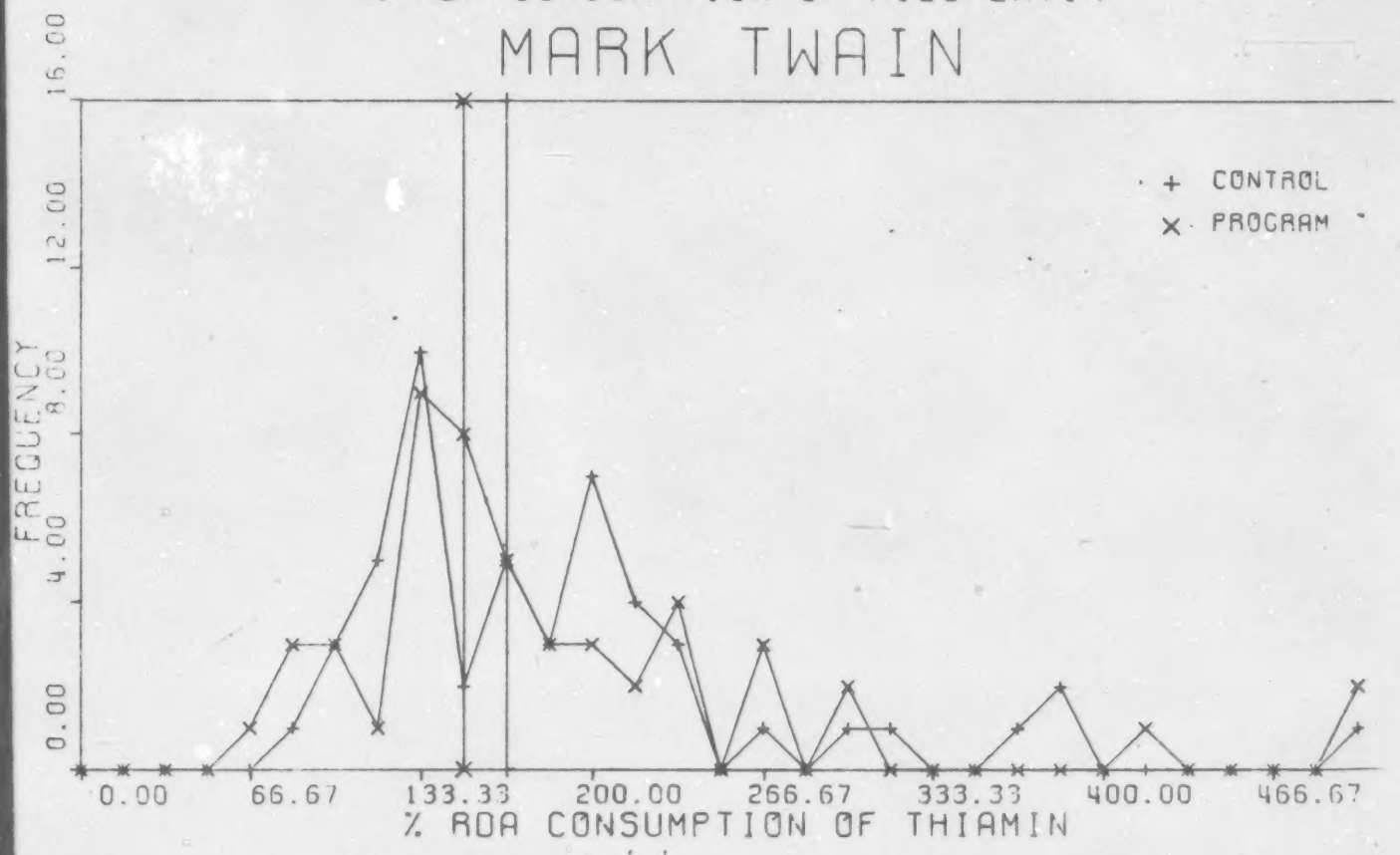

MARK TWAIN
8.00
6.00
4.00
2.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF NIACIN EQUIVALENT

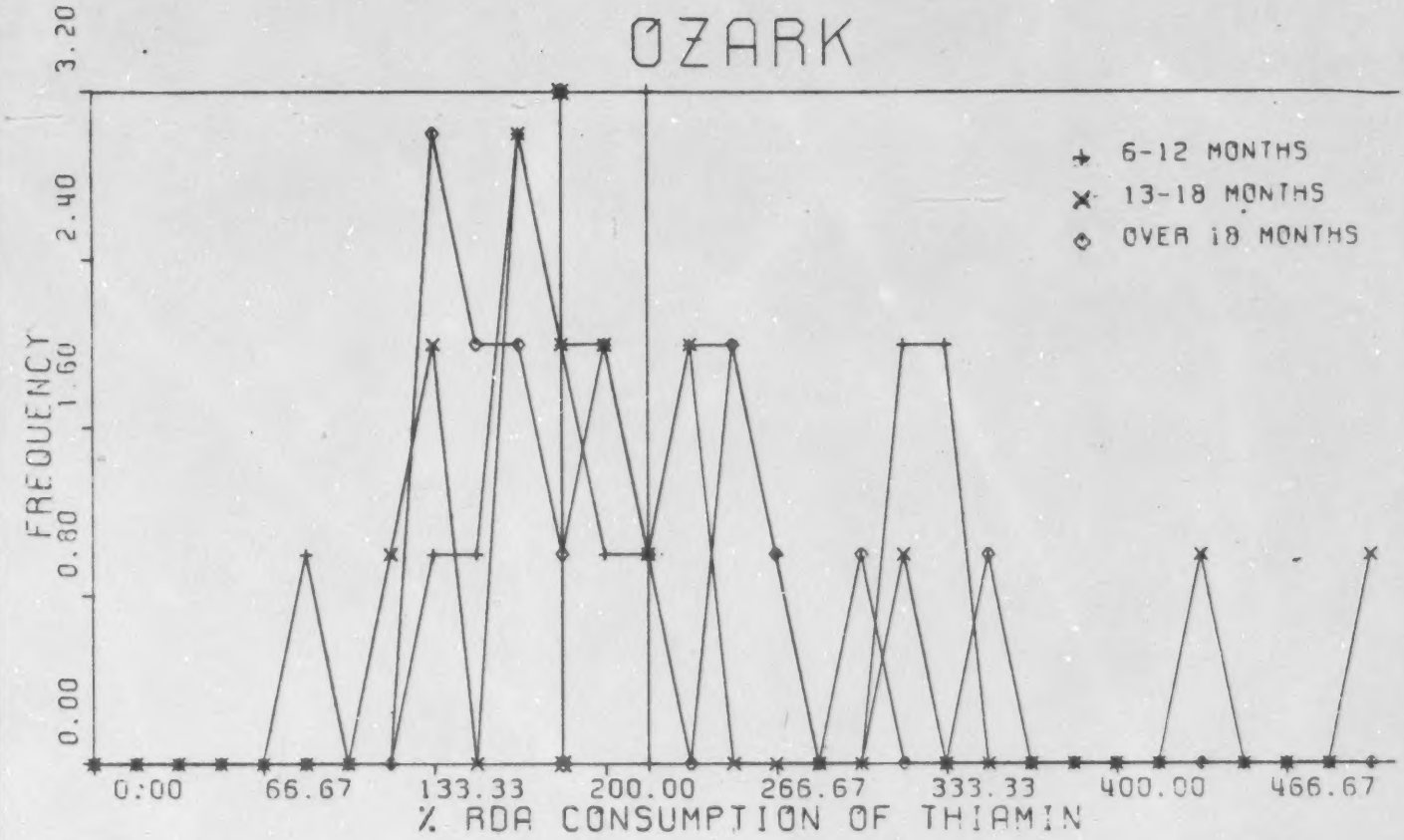

MARK TWAIN
8.00
6.00
4.00
2.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF VITAMIN C

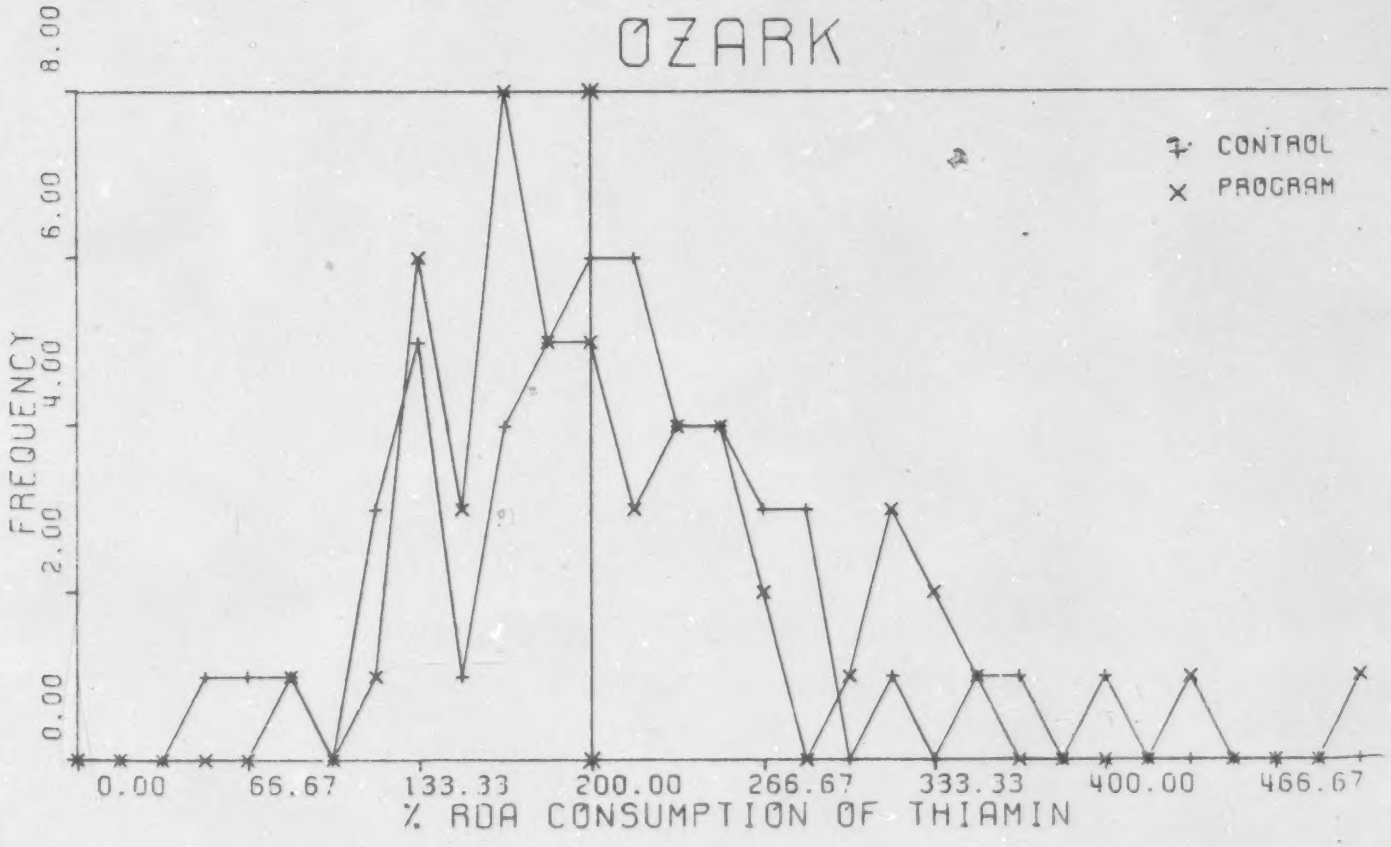

MARK TWAIN
+ CONTROL
× PROGRAM
FREQUENCY
0.00
2.00
4.00
6.00
8.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF VITAMIN A

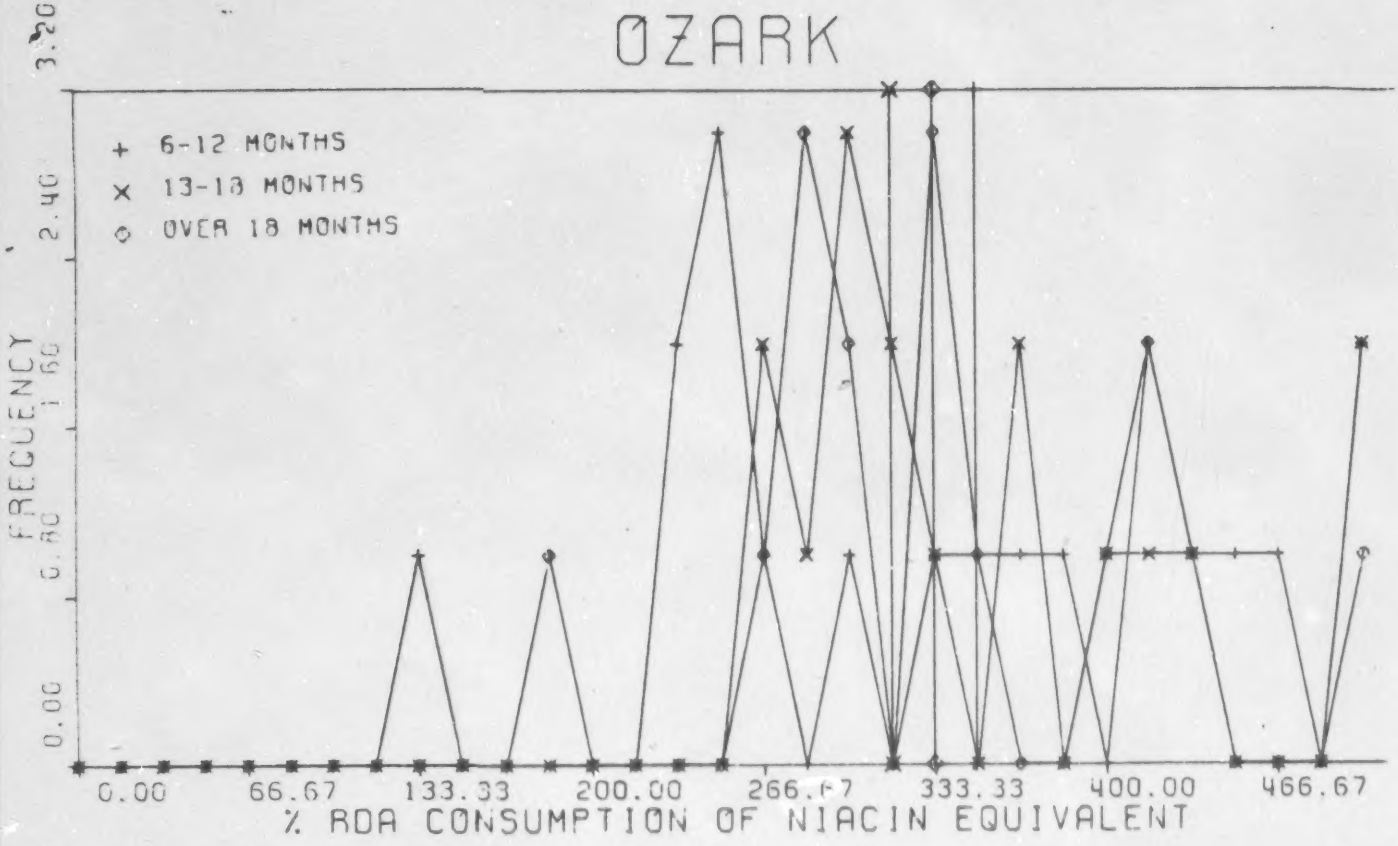

MARK TWAIN
+ CONTROL
× PROGRAM
FREQUENCY
0.00
4.00
8.00
12.00
16.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF IRON

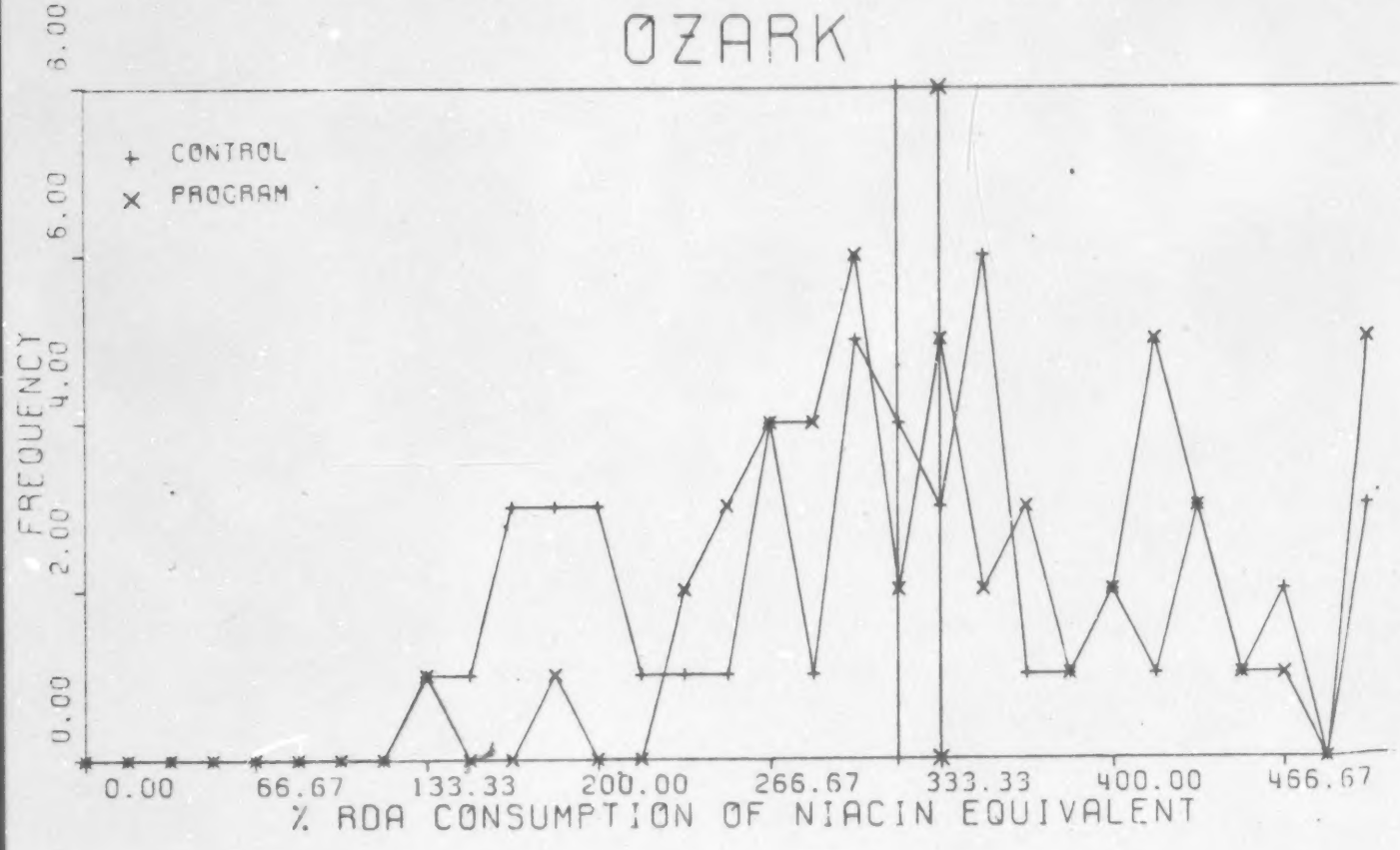

MARK TWAIN
16.00
12.00
8.00
4.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF RIBOFLAVIN

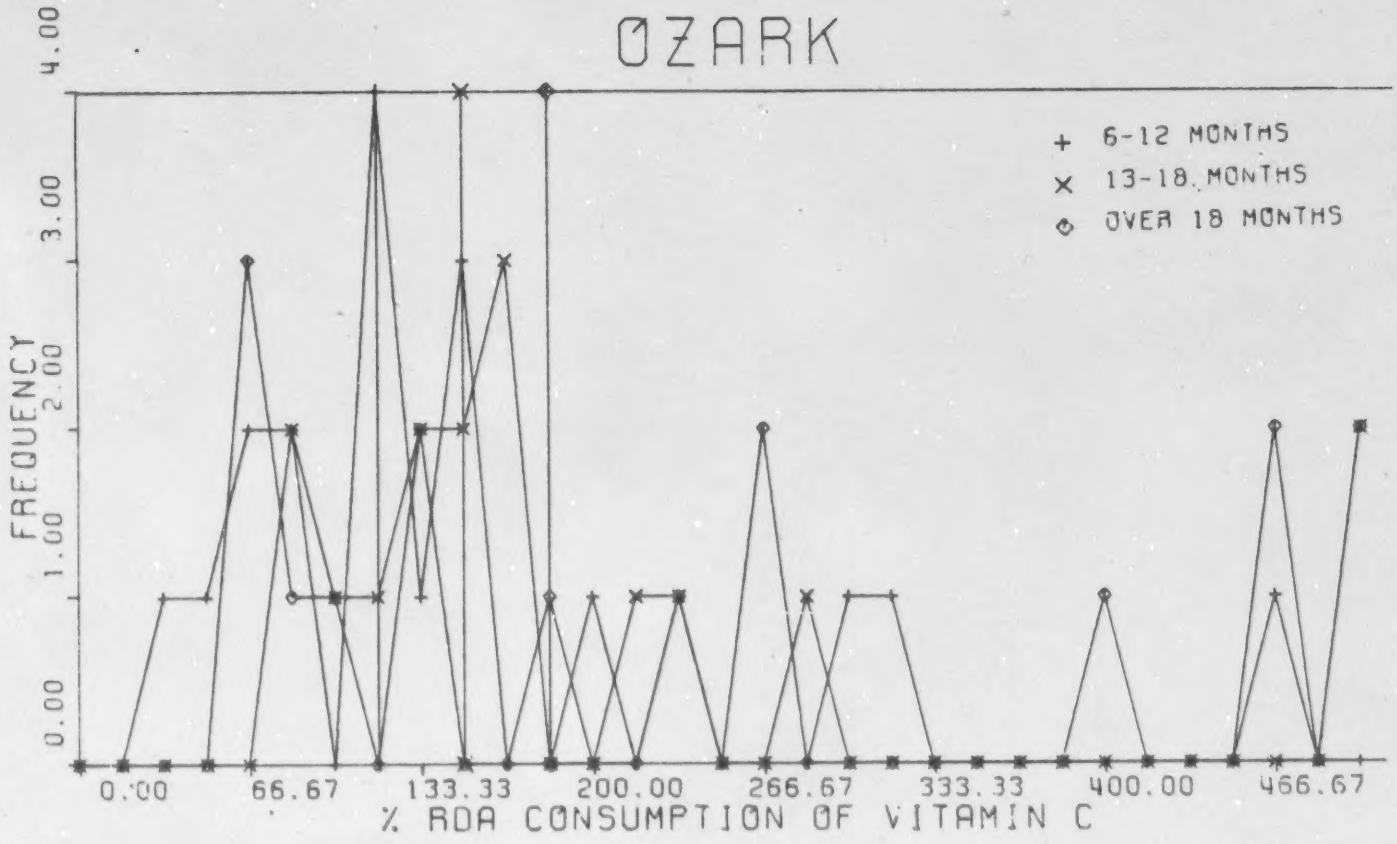

MARK TWAIN
16.00
12.00
8.00
4.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF THIAMIN

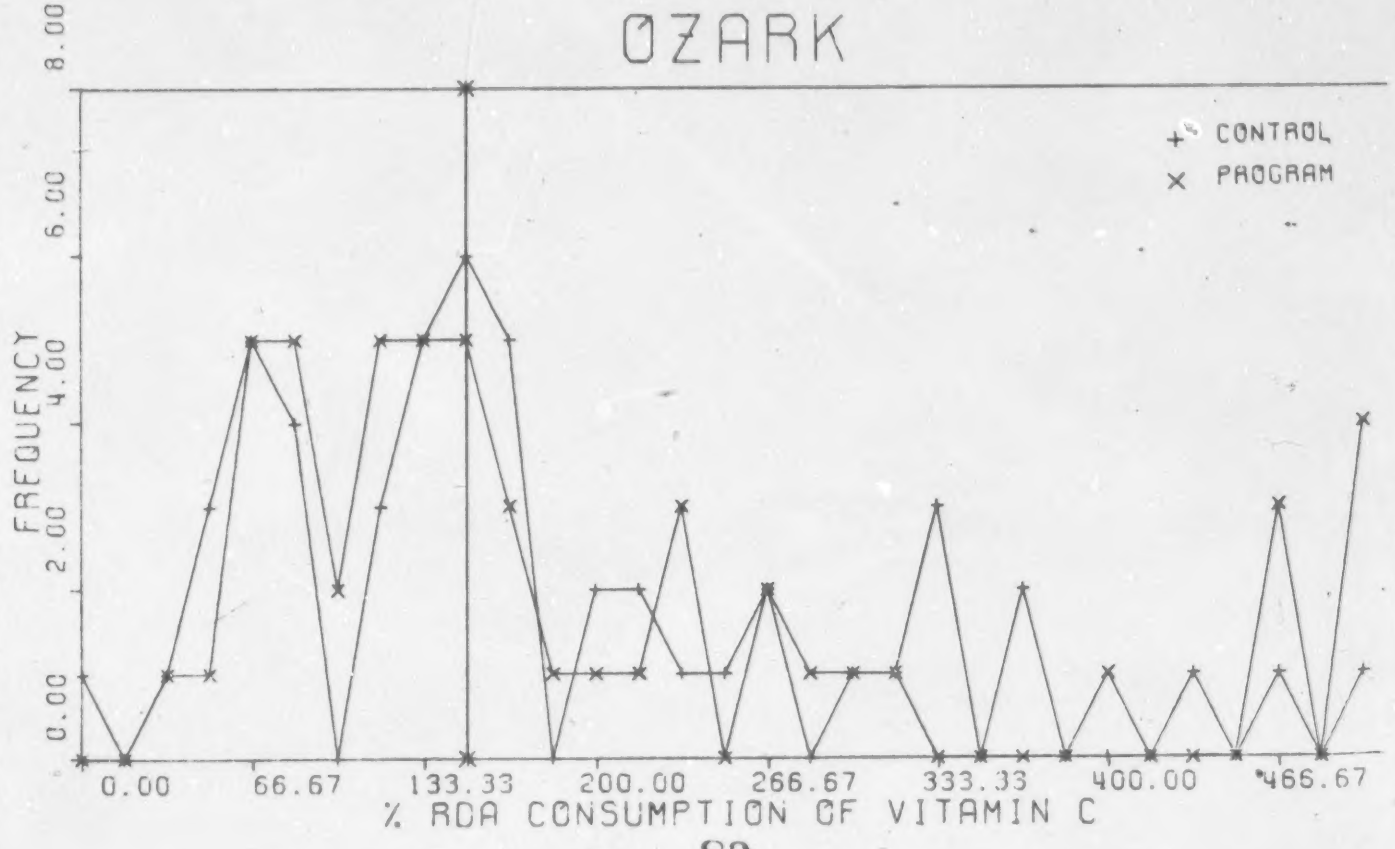

OZARK
3.20
2.40
1.60
0.80
0.00
FREQUENCY
6-12 MONTHS
13-18 MONTHS
OVER 18 MONTHS
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF THIAMIN

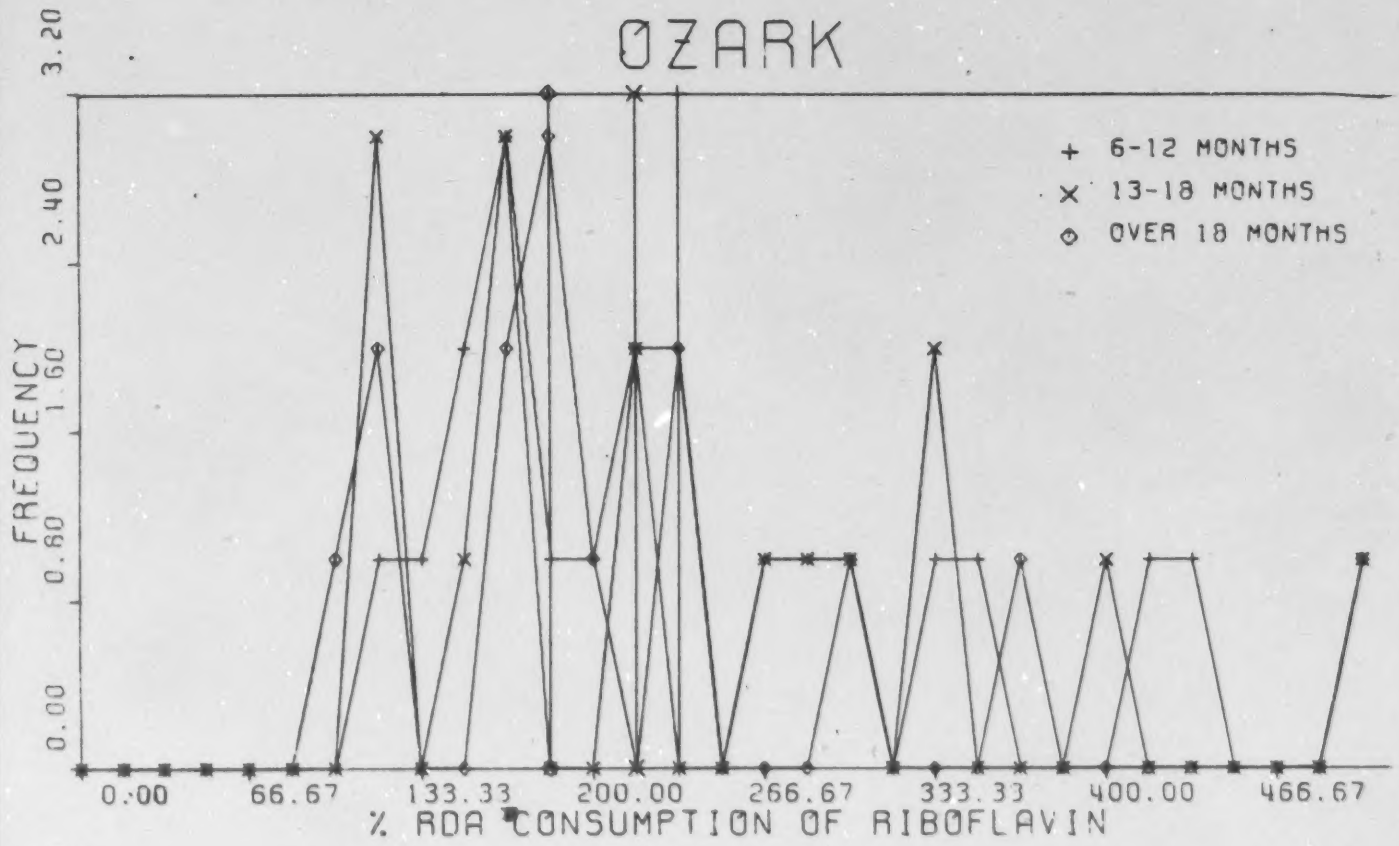

OZARK
8.00
6.00
4.00
2.00
0.00
FREQUENCY
CONTROL
PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF THIAMIN

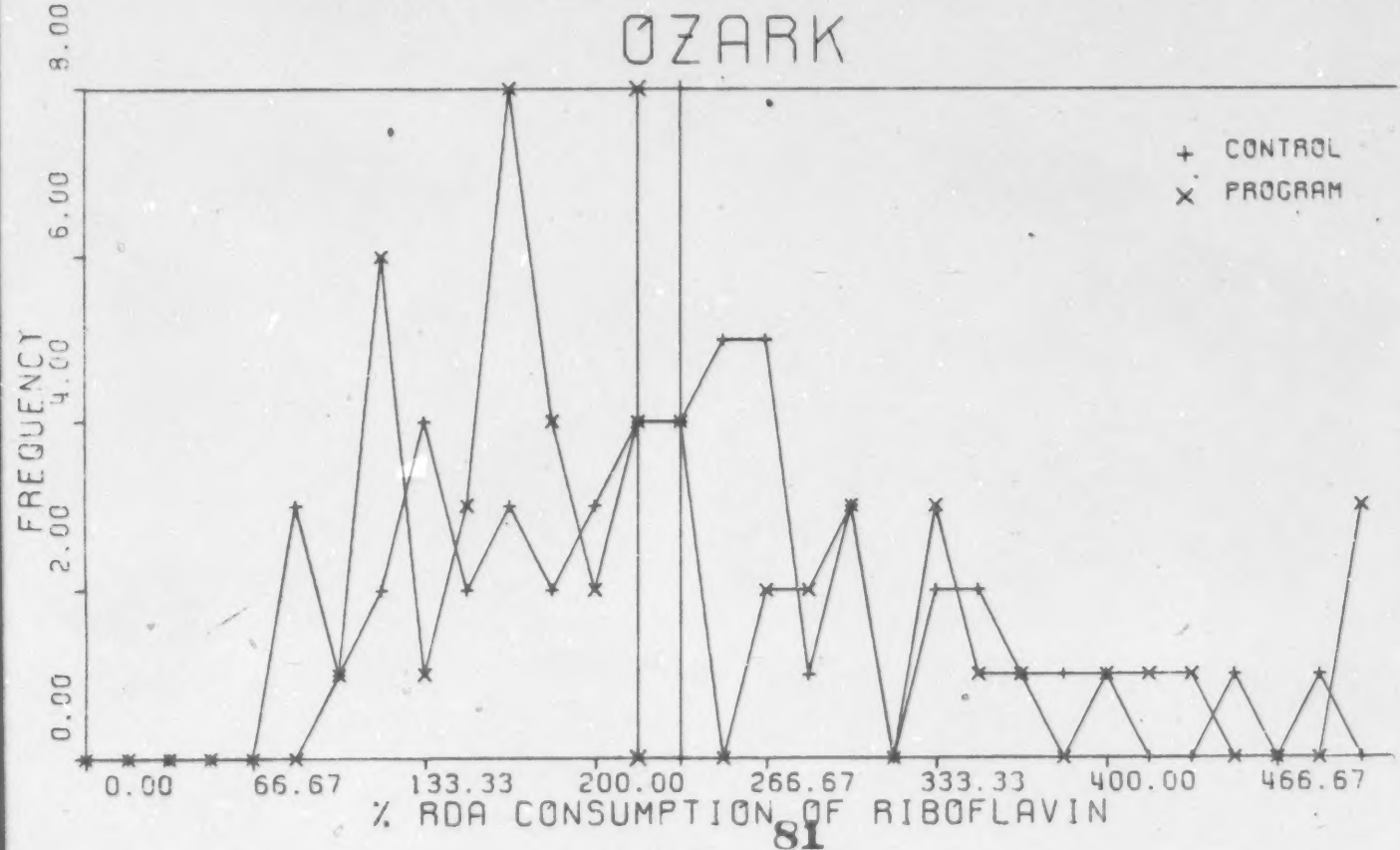

OZARK
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
FREQUENCY
3.20
2.40
1.60
0.80
0.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF NIACIN EQUIVALENT

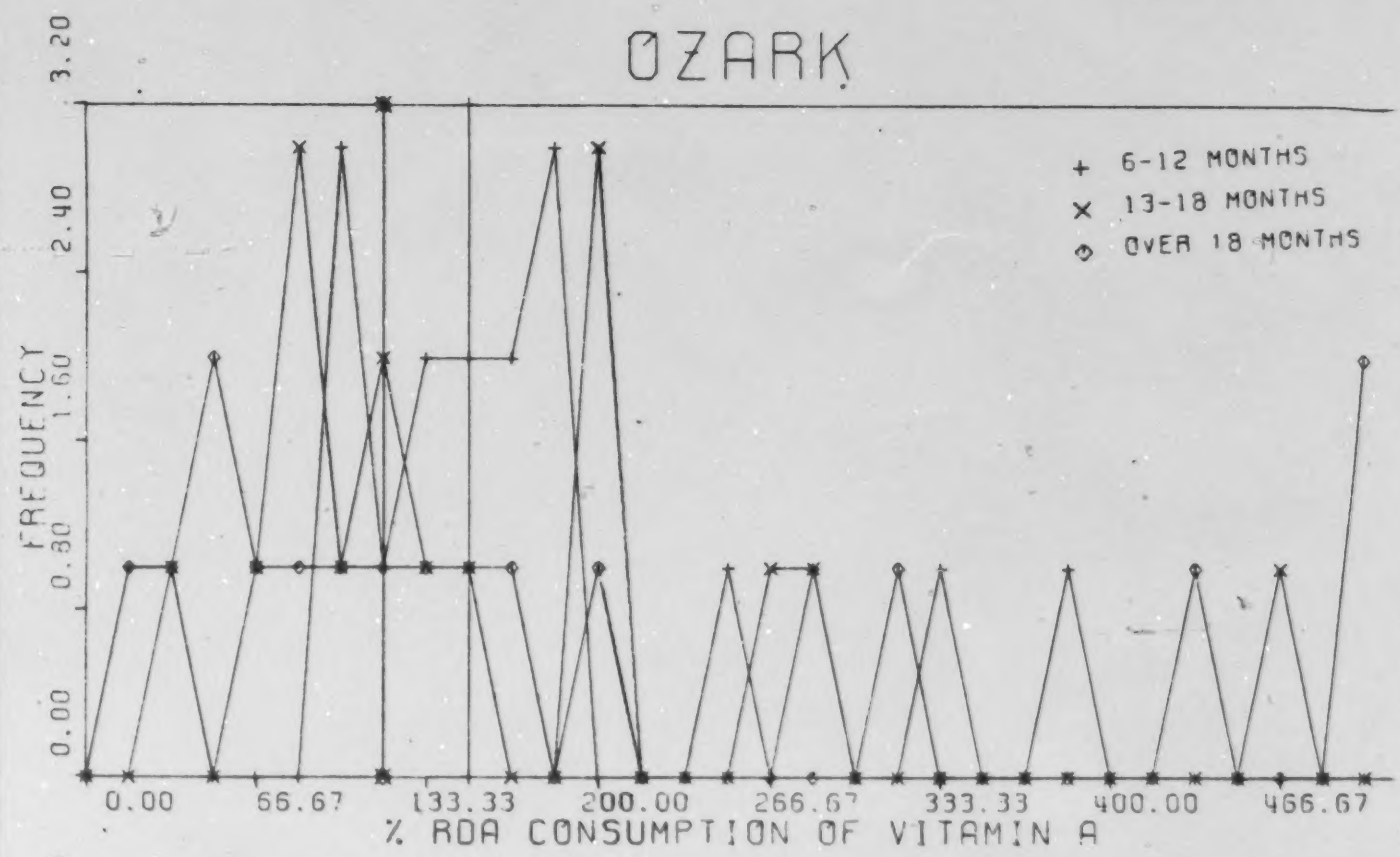

OZARK
+ CONTROL
× PROGRAM
FREQUENCY
8.00
6.00
4.00
2.00
0.00
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF NIACIN EQUIVALENT

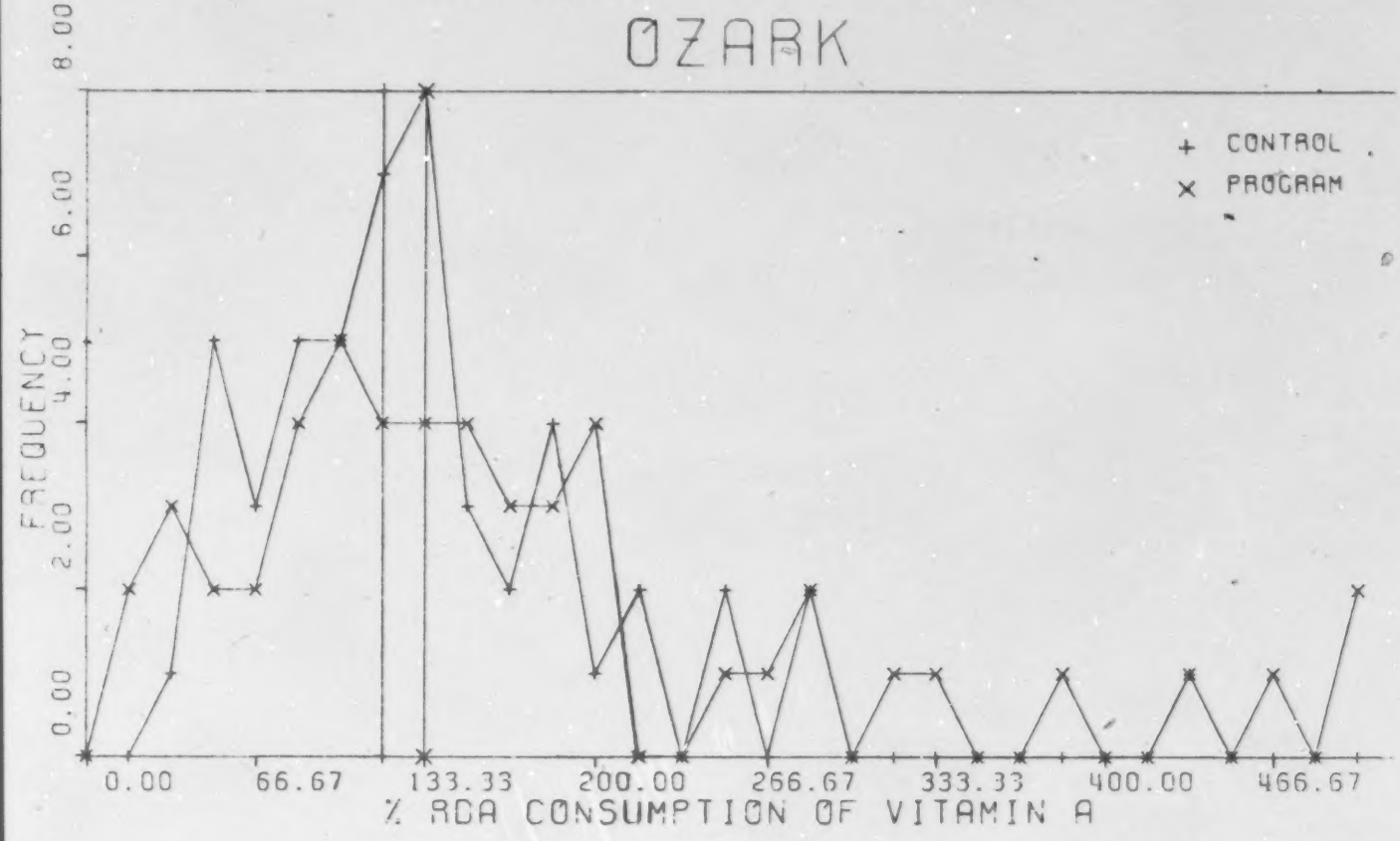

OZARK
4.00
3.00
2.00
1.00
0.00
FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF VITAMIN C

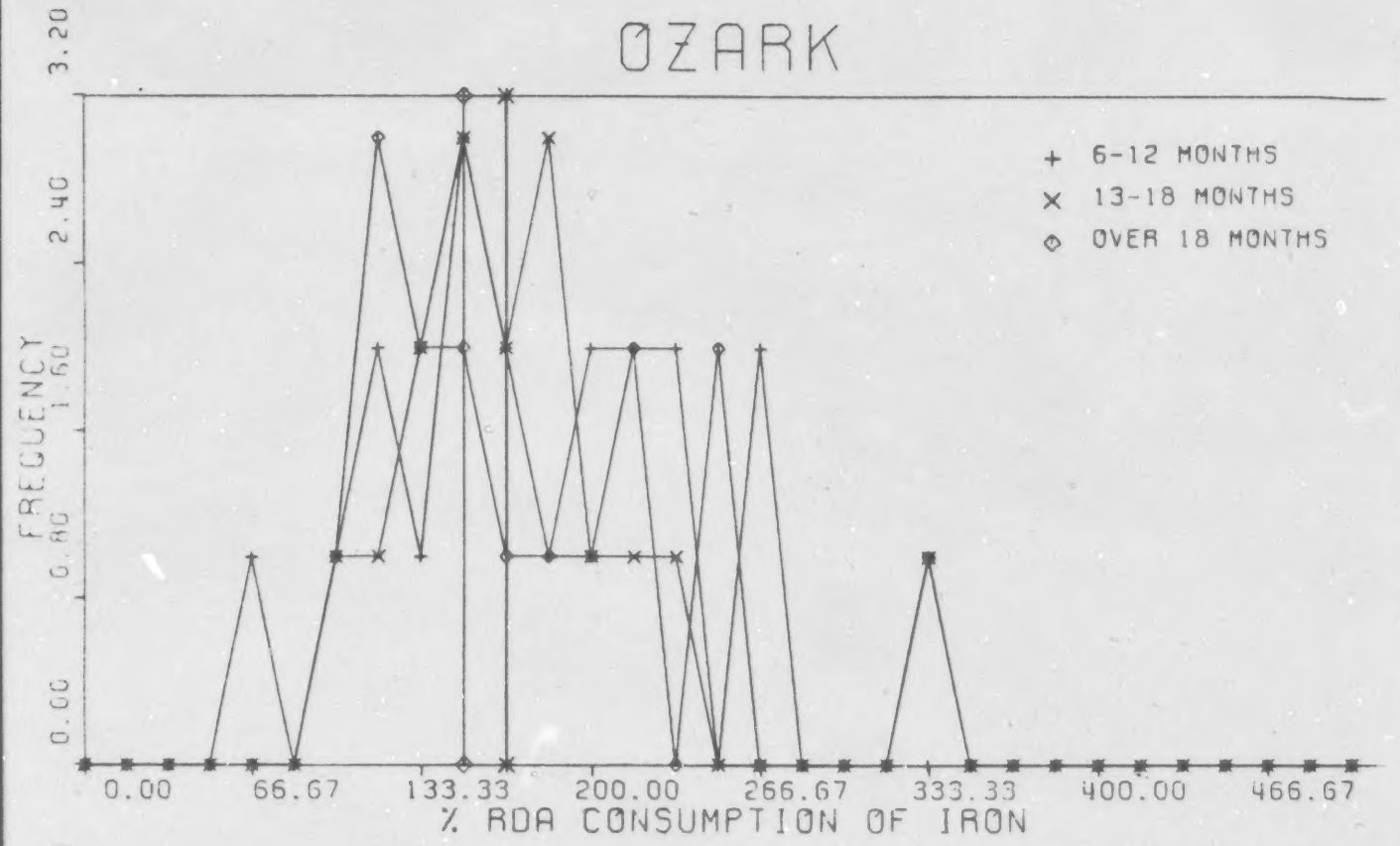

OZARK
8.00
6.00
4.00
2.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF VITAMIN C

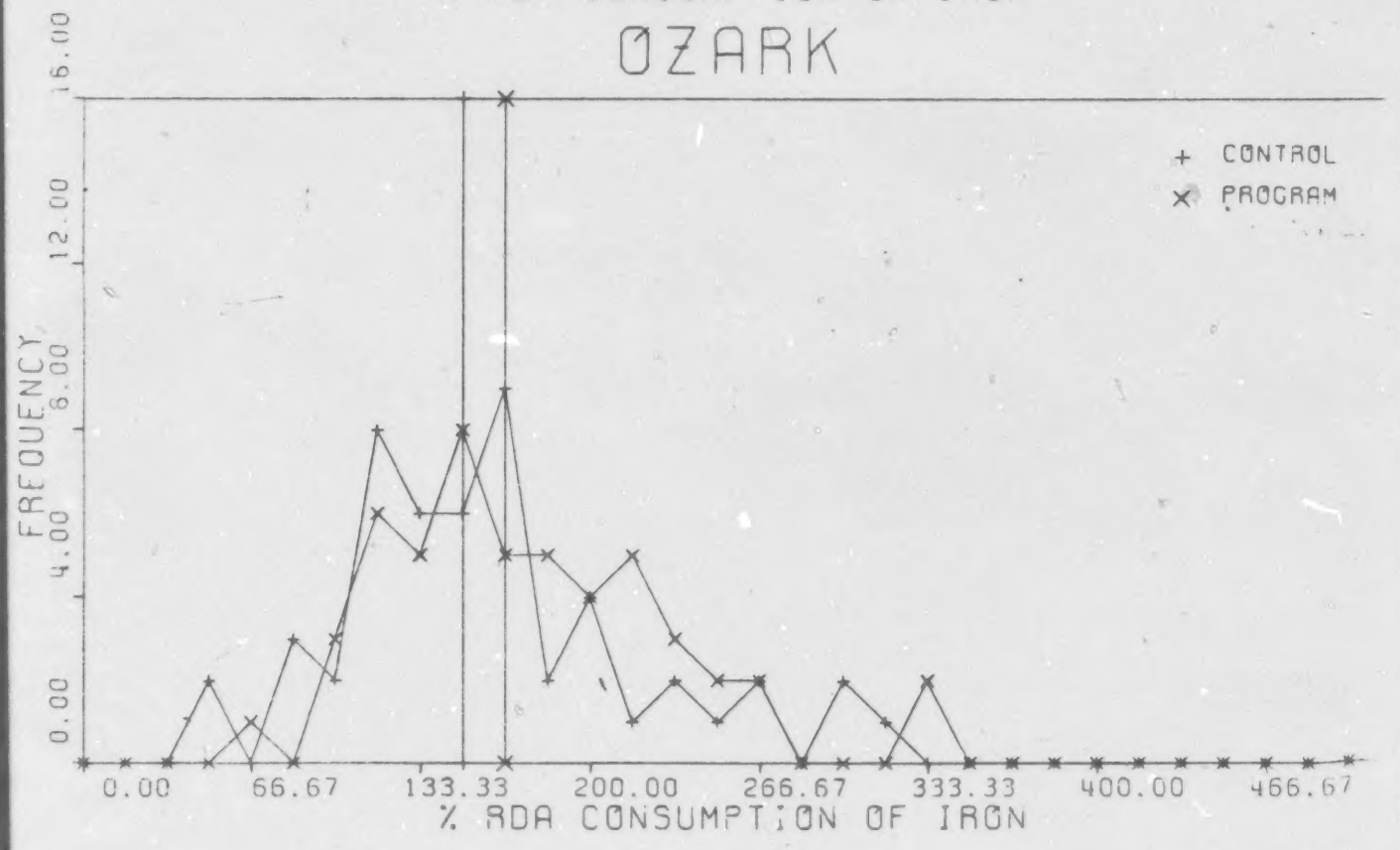

OZARK
3.20
2.40
1.60
0.80
0.00
FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF RIBOFLAVIN

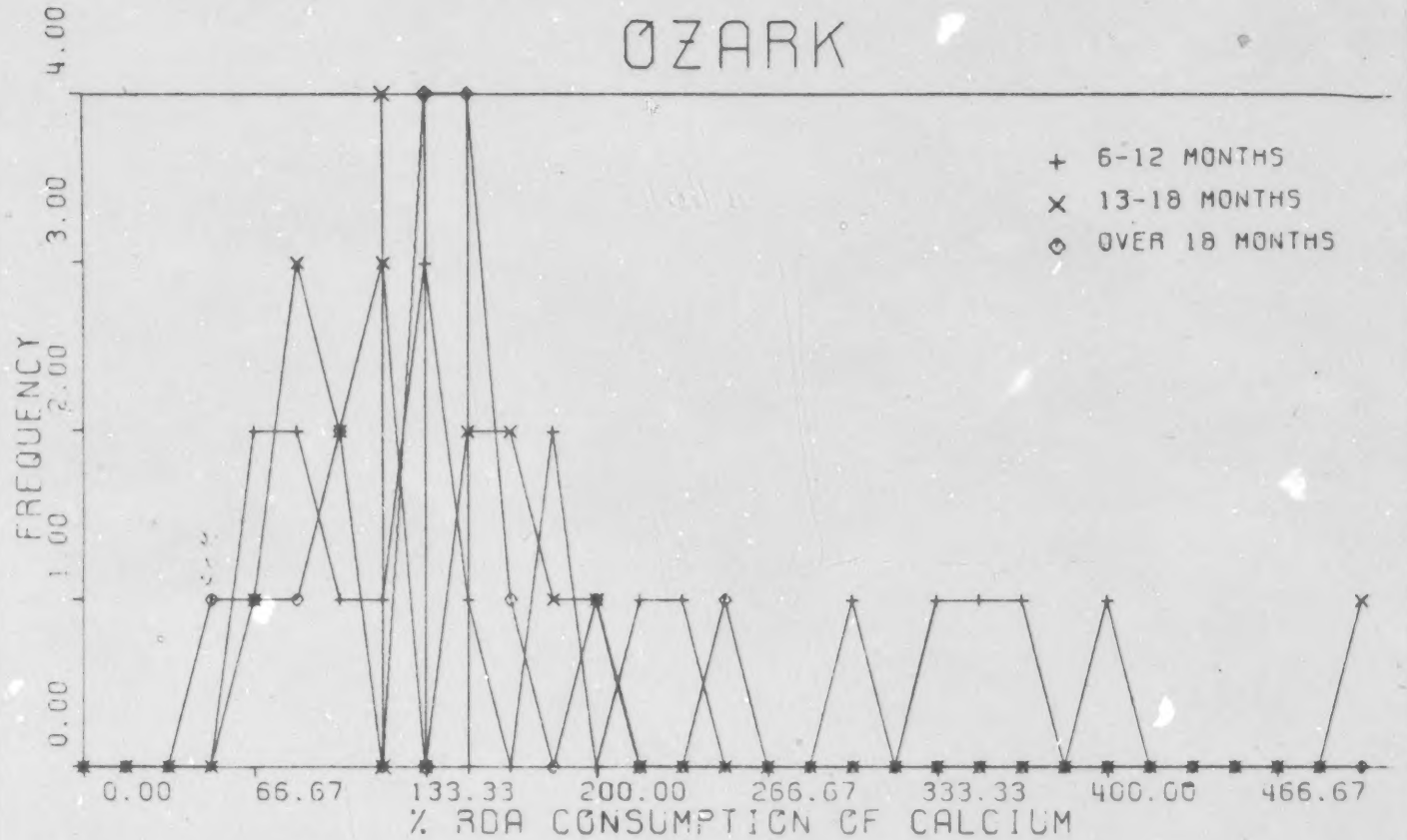

OZARK
8.00
6.00
4.00
2.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF RIBOFLAVIN

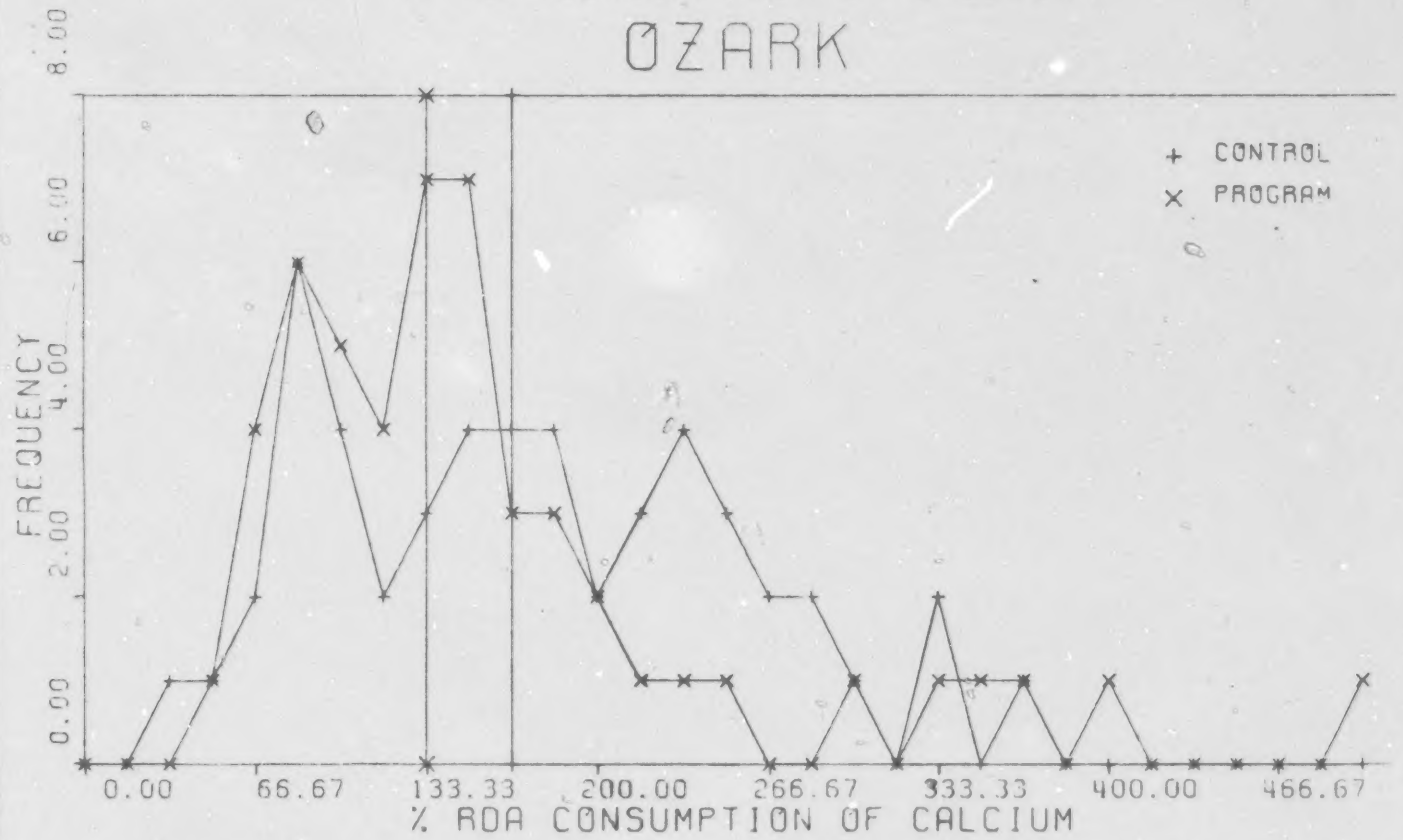

OZARK
3.20
2.40
1.60
0.30
0.00
FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF VITAMIN A


OZARK
8.00
6.00
4.00
2.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF VITAMIN A


OZARK
3.20
2.40
1.60
0.80
0.00
FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF IRON


OZARK
16.00
12.00
8.00
4.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF IRON


OZARK
4.00
3.00
2.00
1.00
0.00
FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
0.00
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF CALCIUM


OZARK
8.00
6.00
4.00
2.00
0.00
FREQUENCY
+ CONTROL
× PROGRAM
0.00
66.67
133.33
200.00
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400.00
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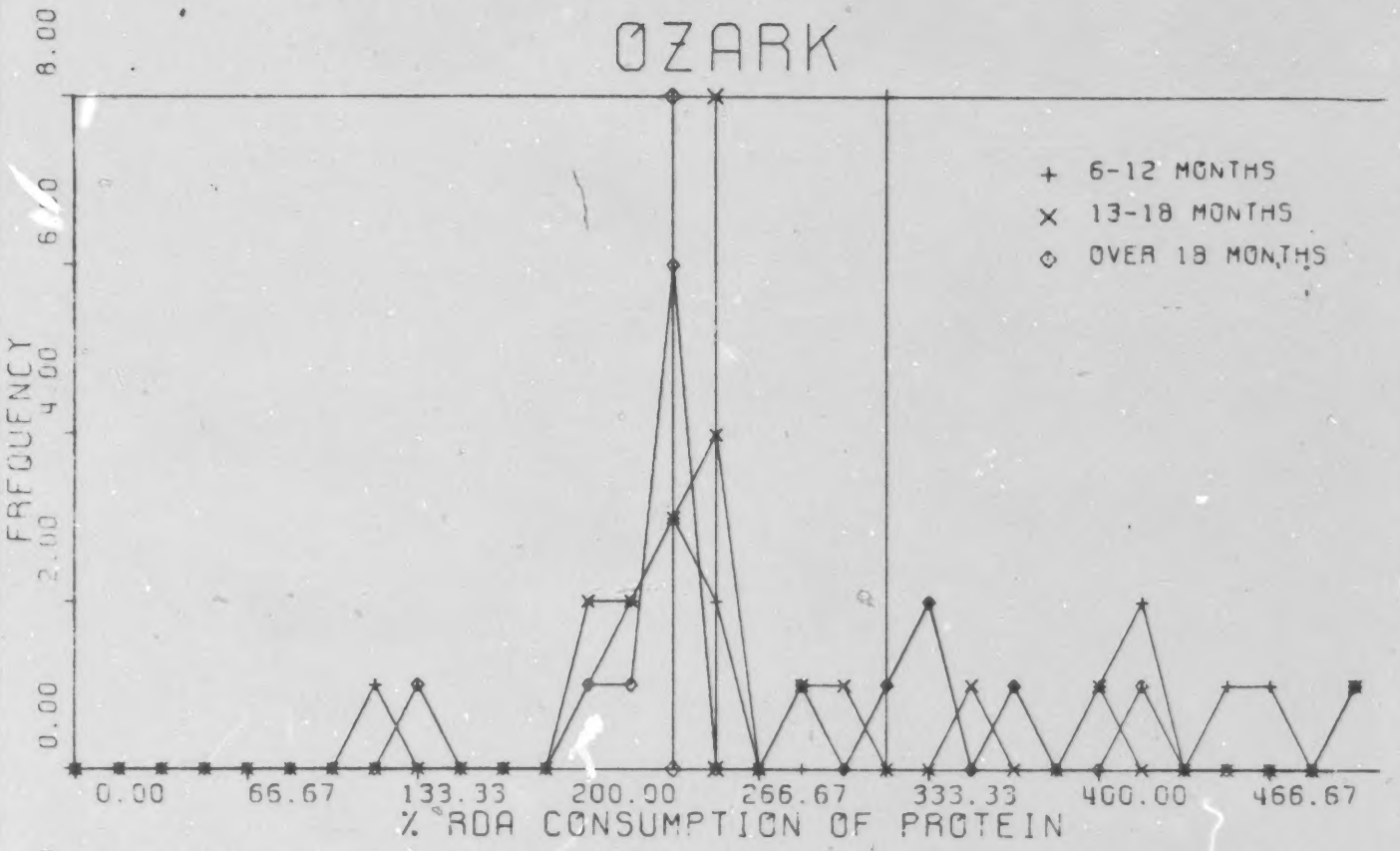
% RDA CONSUMPTION OF CALCIUM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FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
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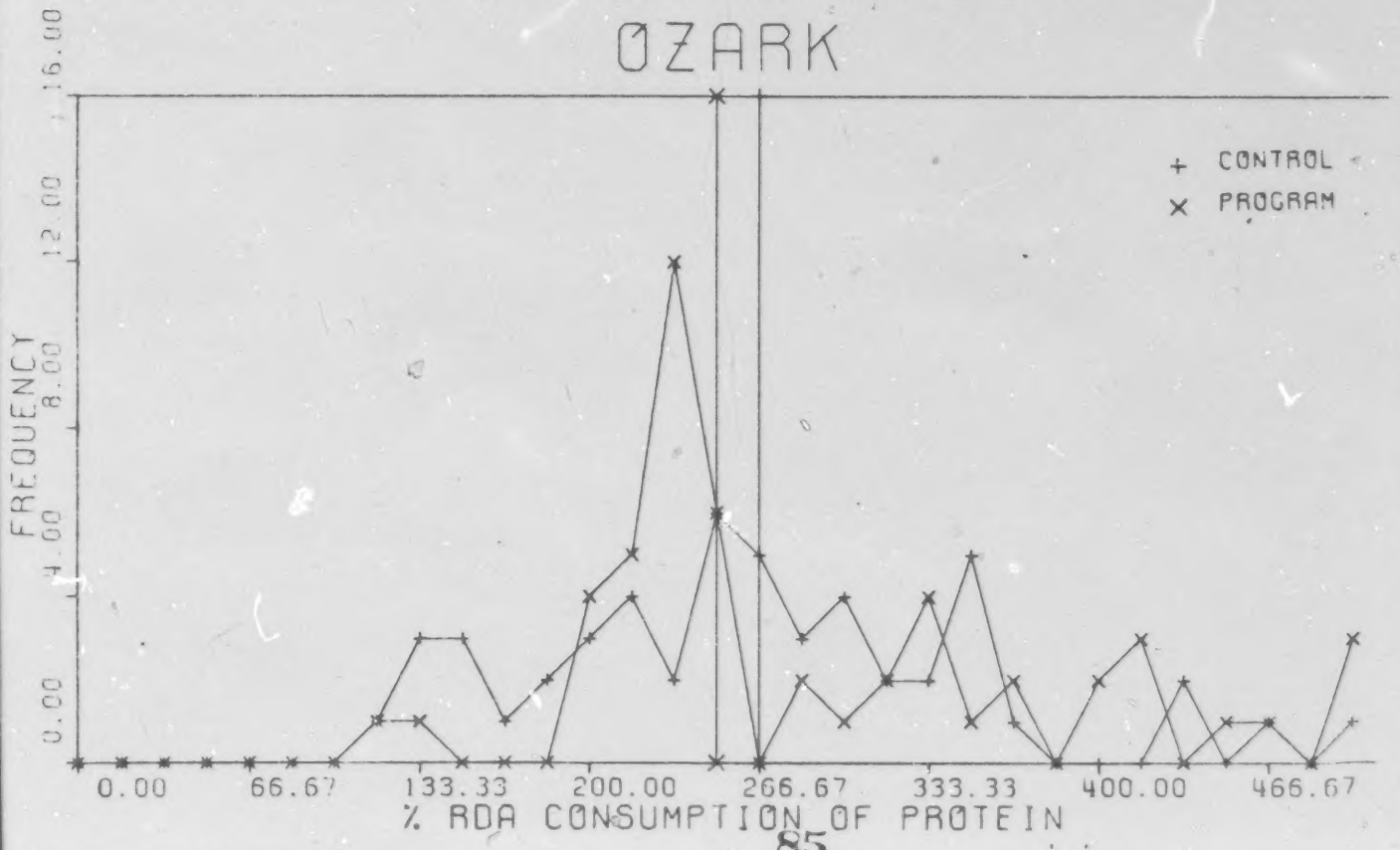
% RDA CONSUMPTION OF PROTEIN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+ CONTROL
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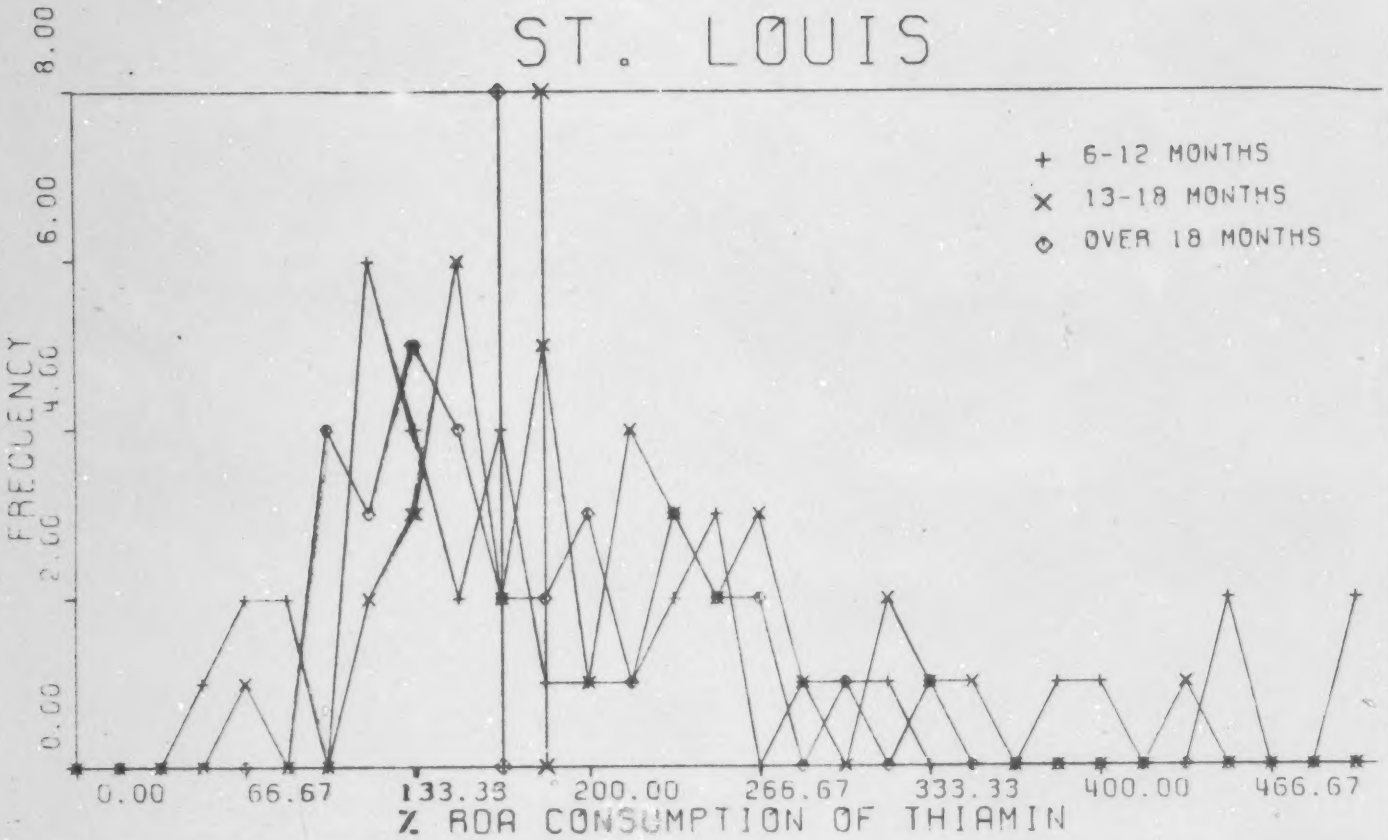
% RDA CONSUMPTION OF PROTEIN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× 13-18 MONTHS
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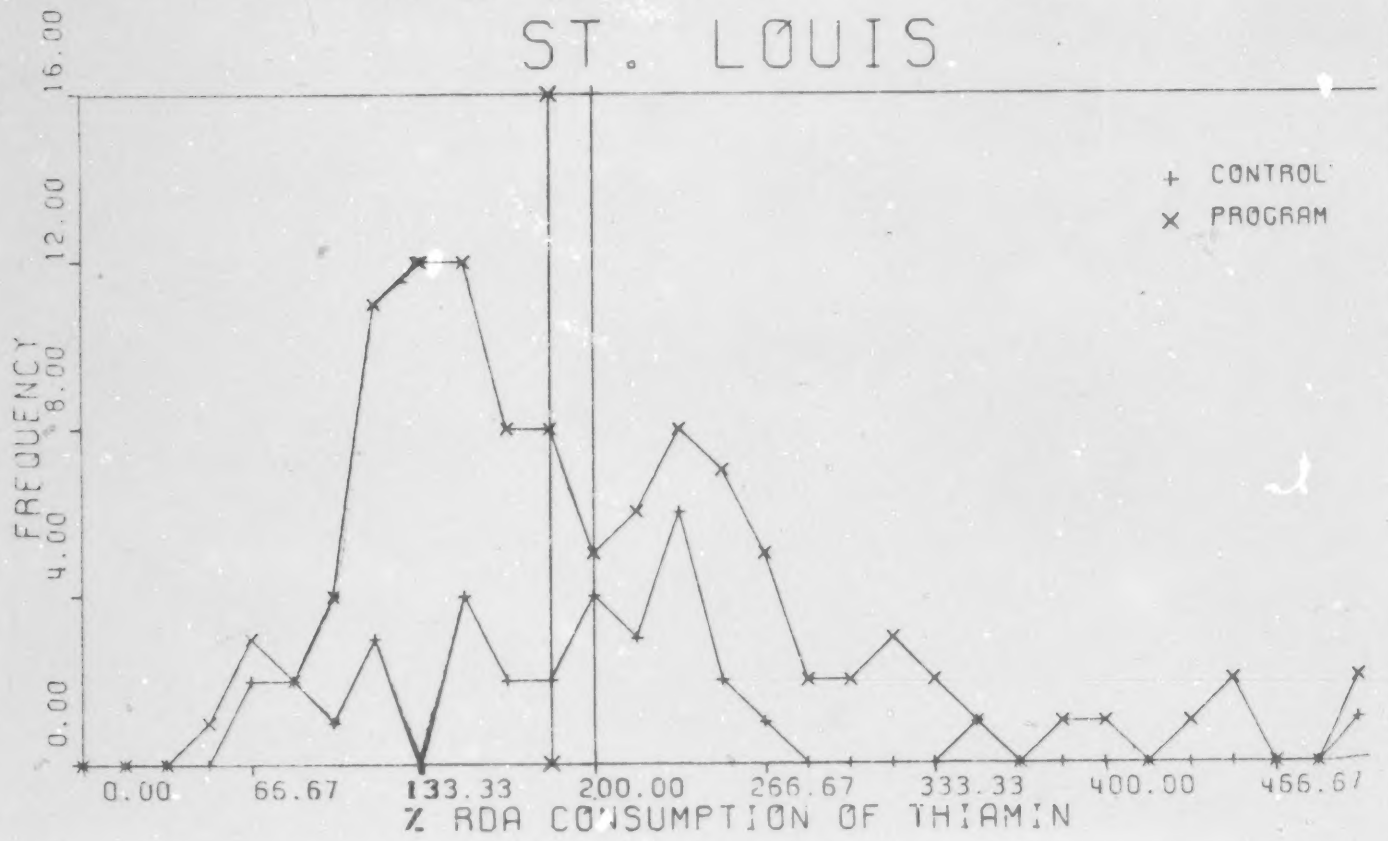
% RDA CONSUMPTION OF THIAMIN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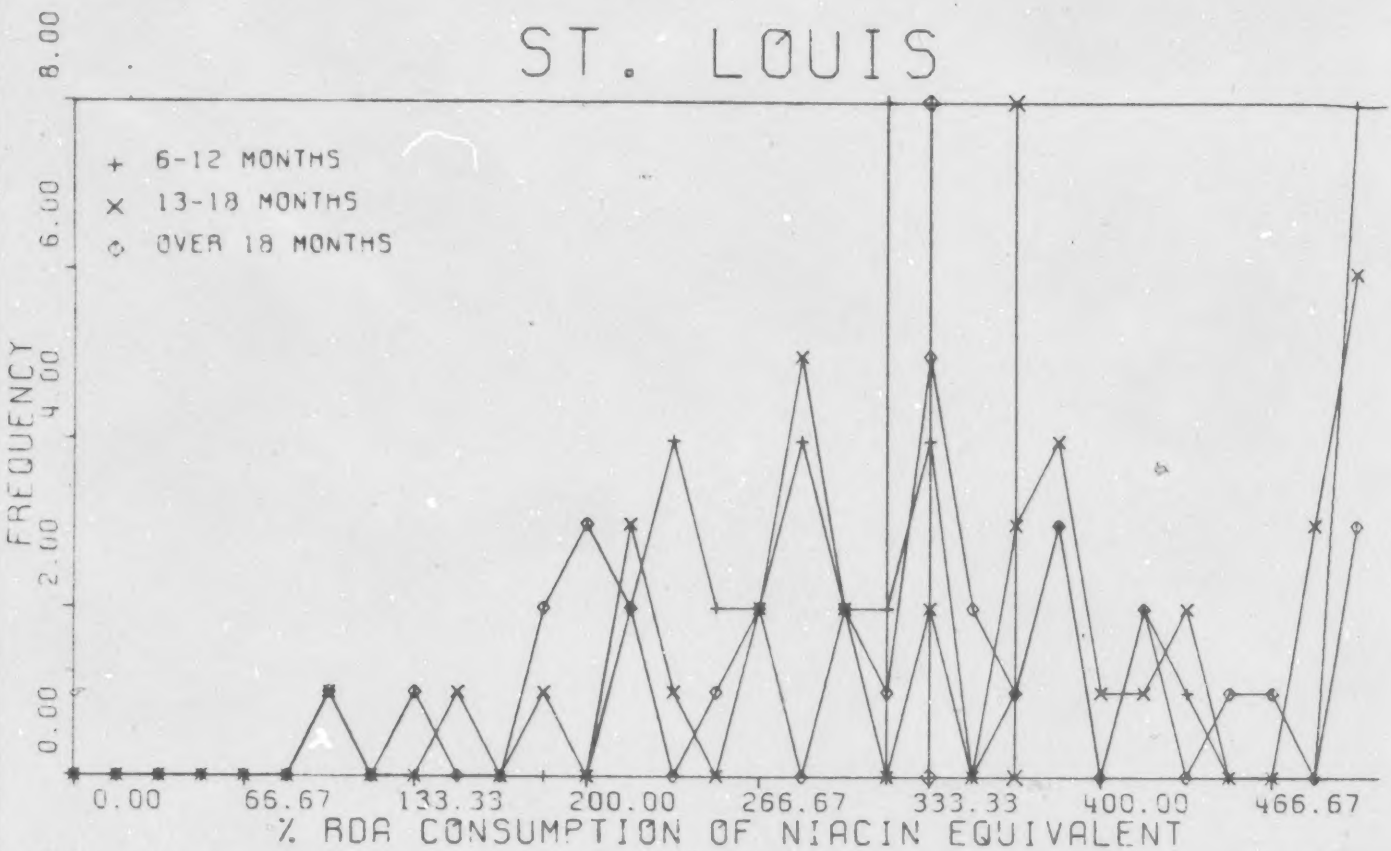
ST. LOUIS
+ 6-12 MONTHS
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◇ OVER 18 MONTHS
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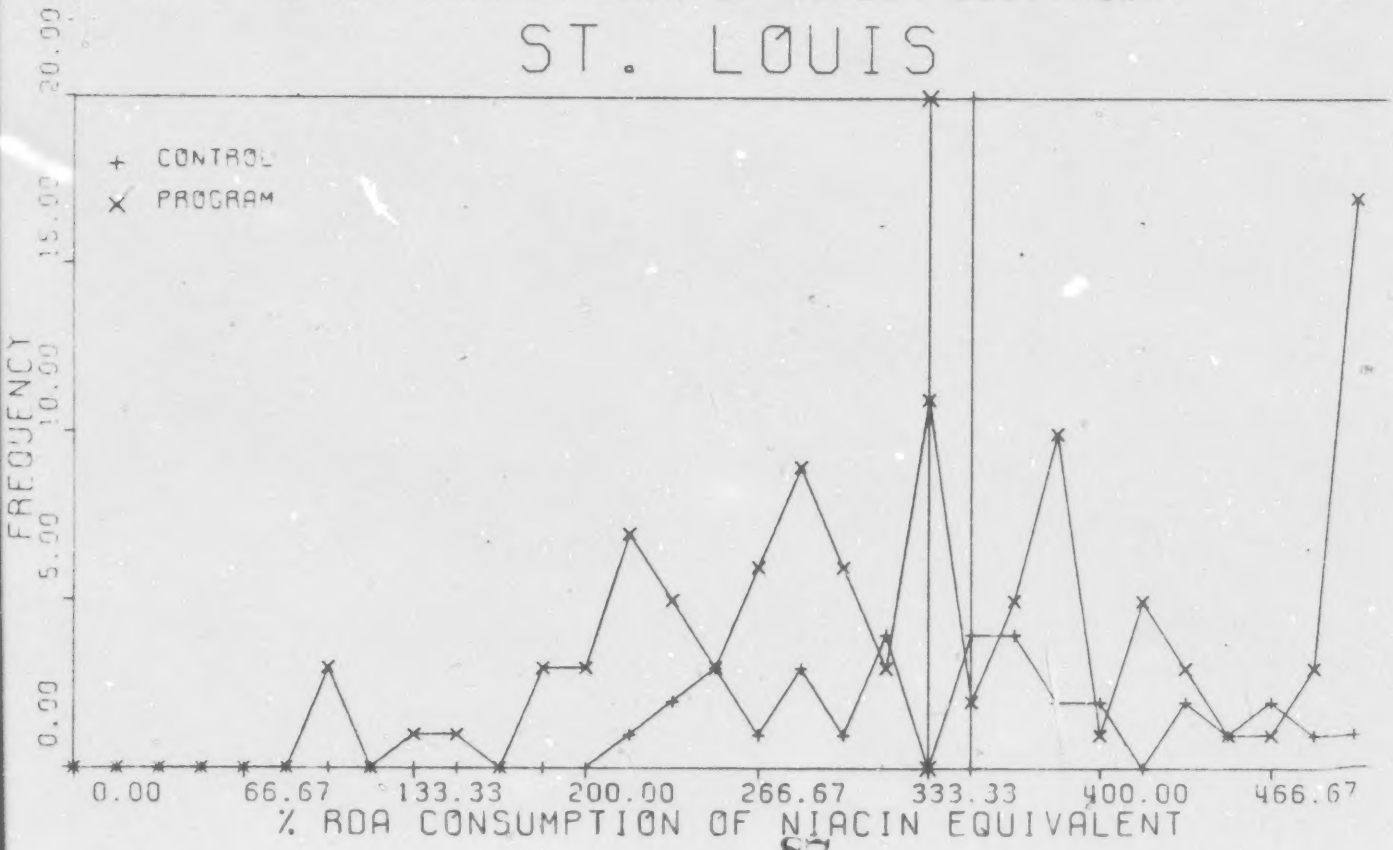
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× PROGRAM
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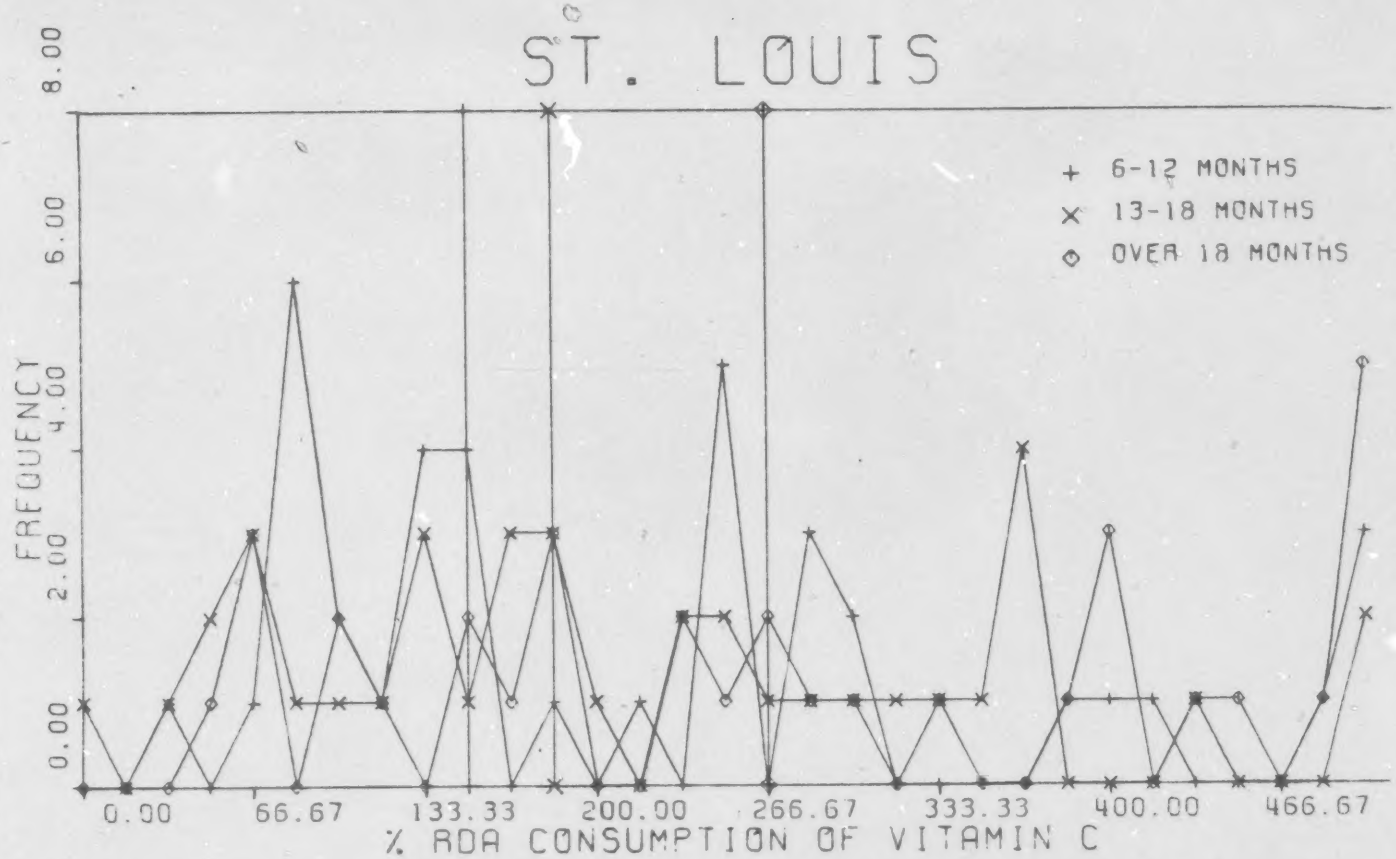
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◇ OVER 18 MONTHS
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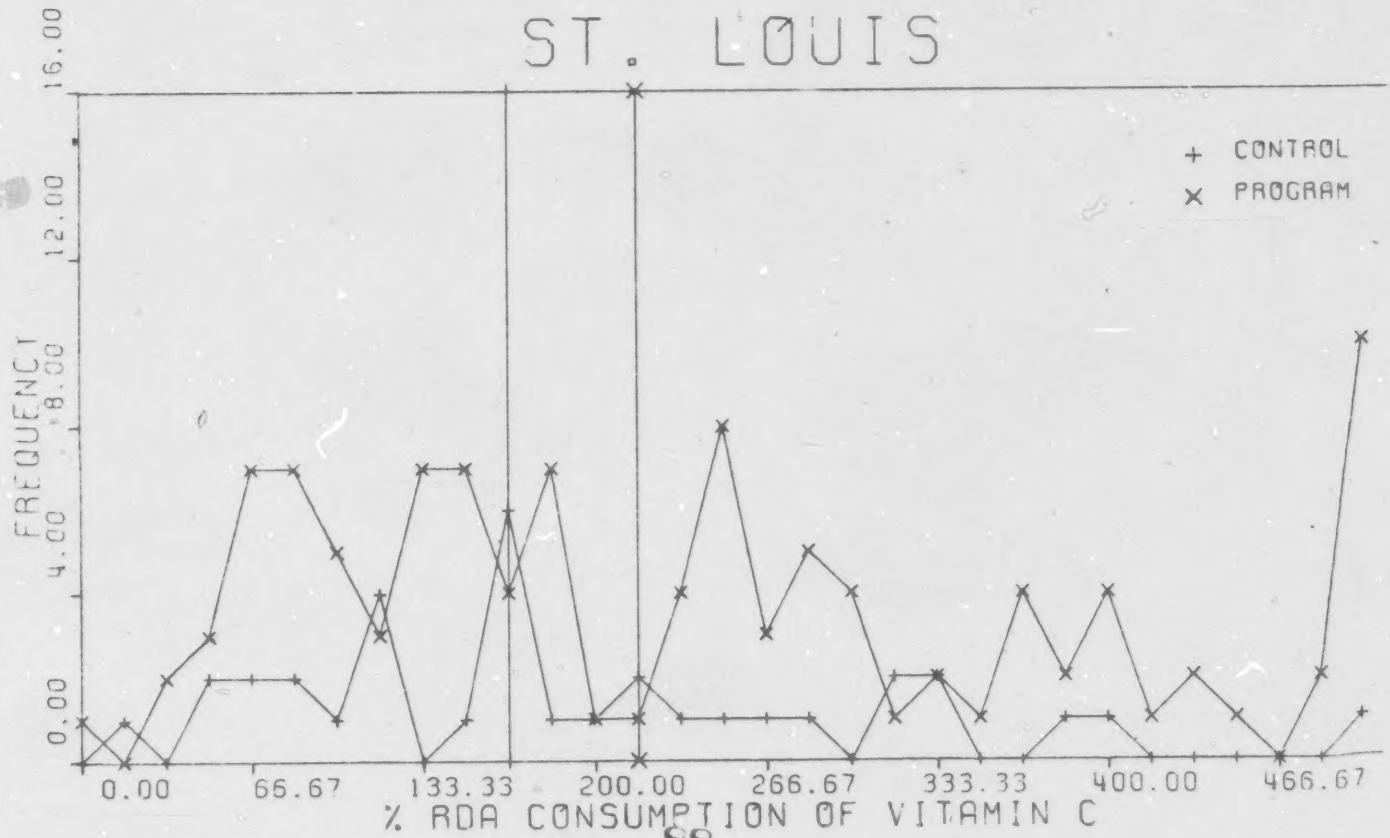
% RDA CONSUMPTION OF VITAMIN C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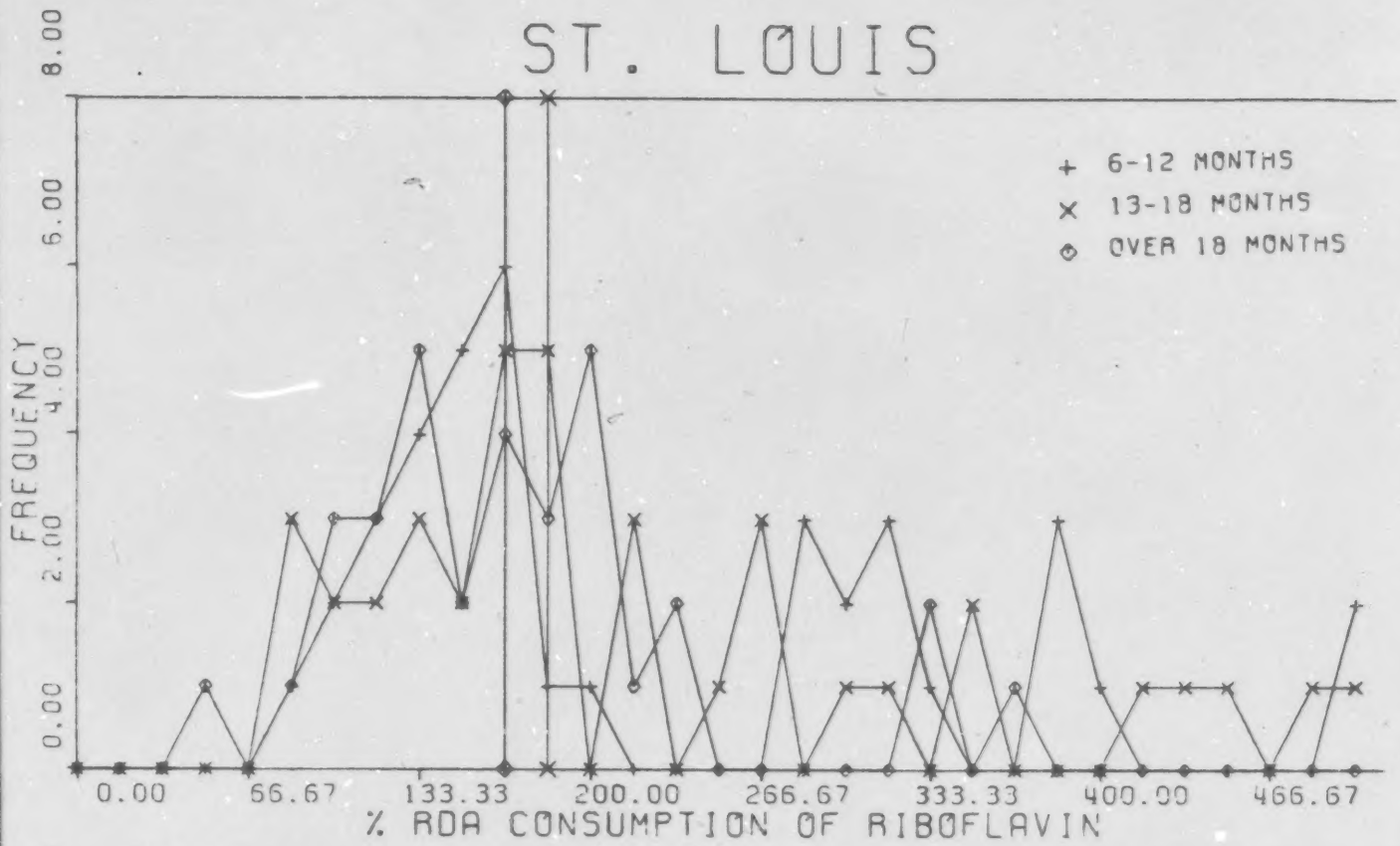
% RDA CONSUMPTION OF VITAMIN C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× 13-18 MONTHS
◇ OVER 18 MONTHS
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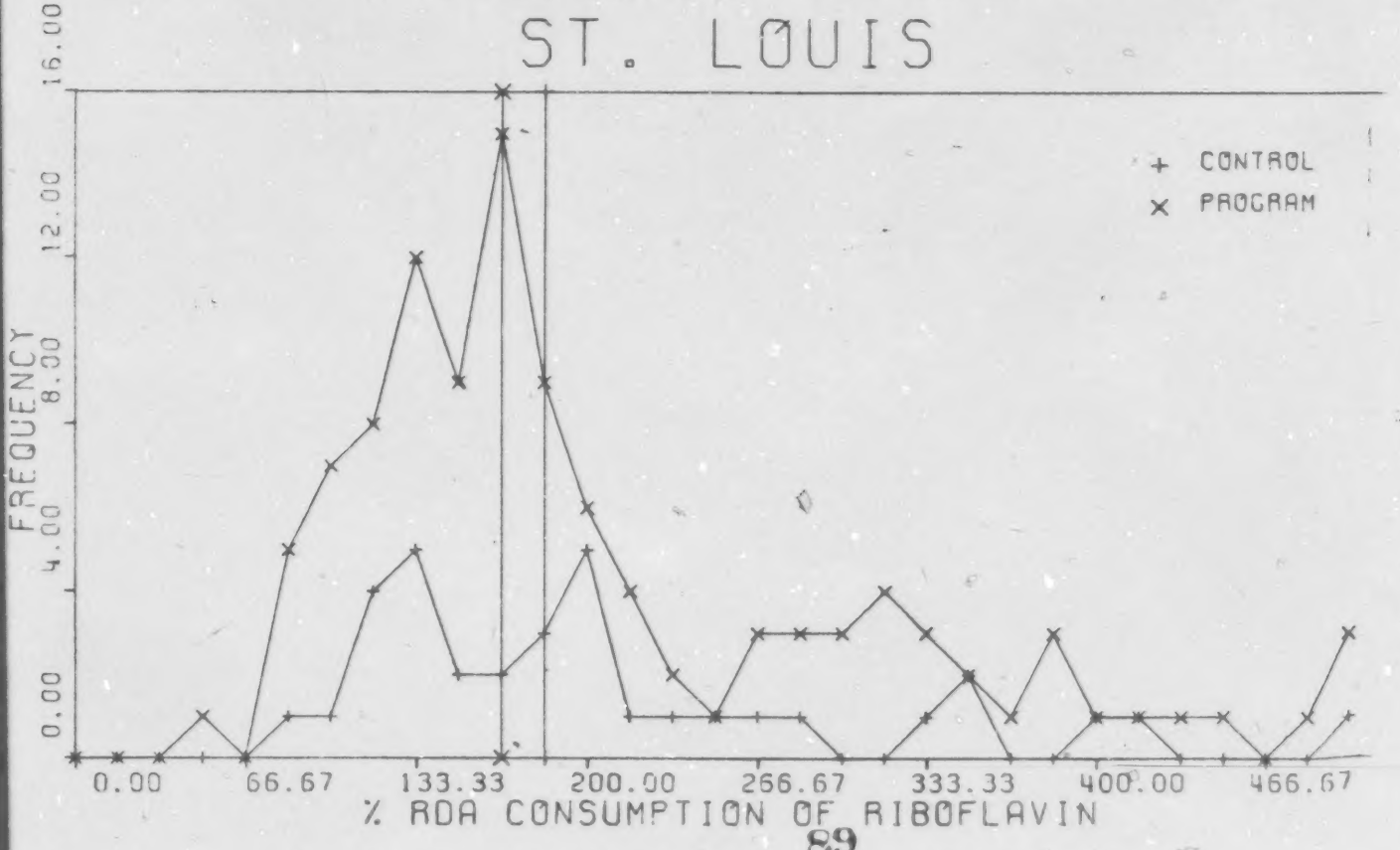
% RDA CONSUMPTION OF RIBOFLAVIN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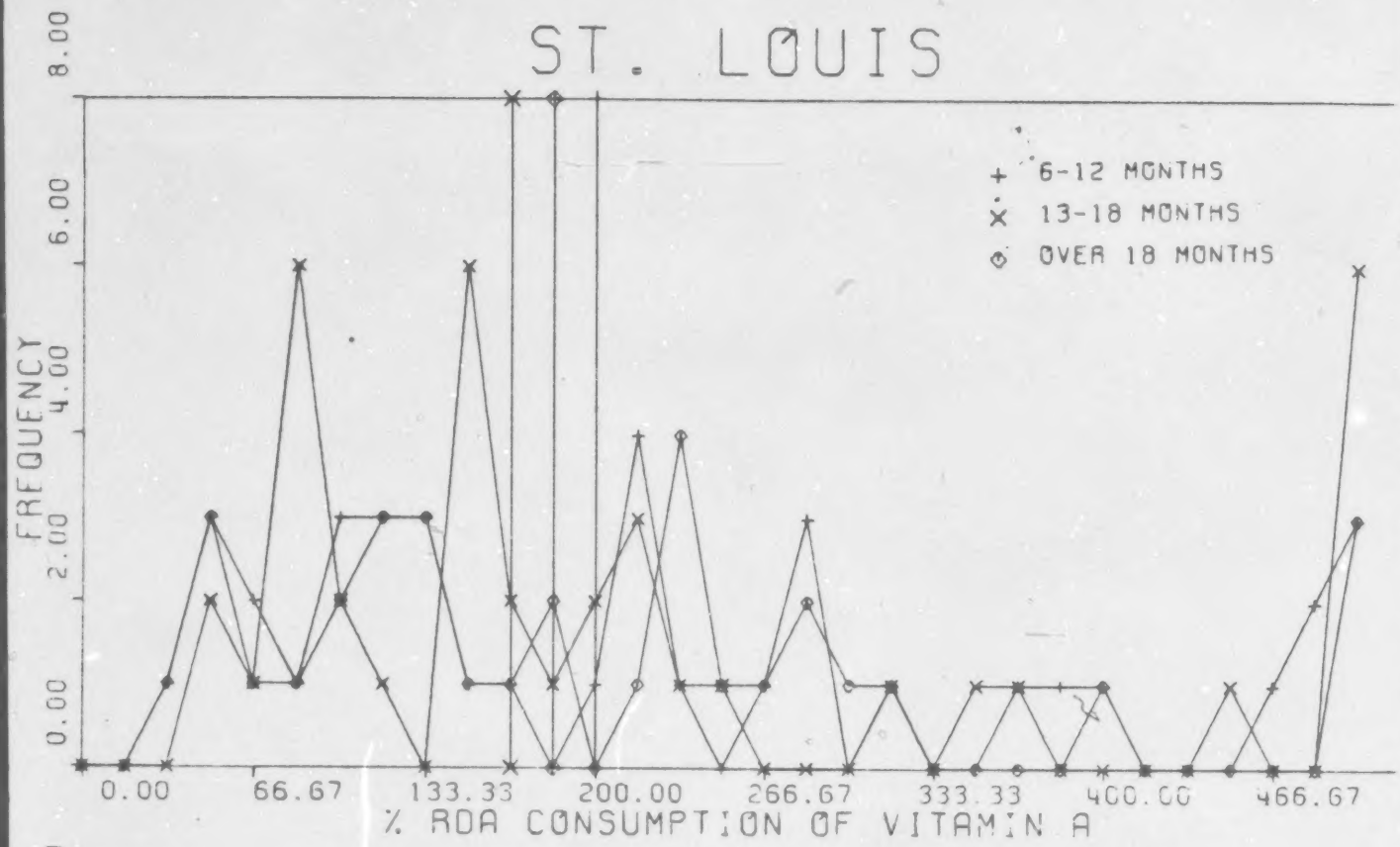
% RDA CONSUMPTION OF RIBOFLAVIN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FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
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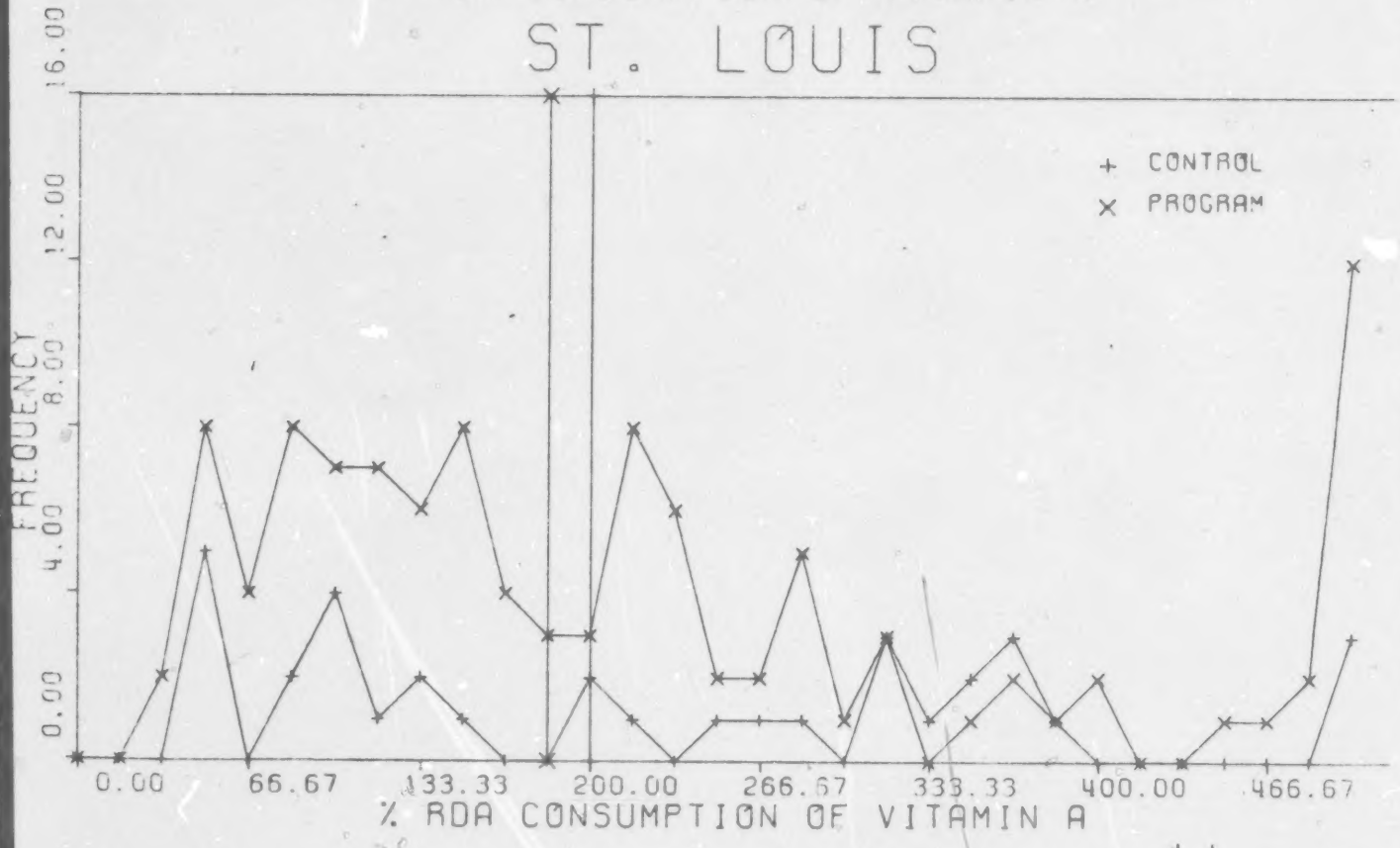
400.00
466.67
% RDA CONSUMPTION OF VITAMIN A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+ CONTROL
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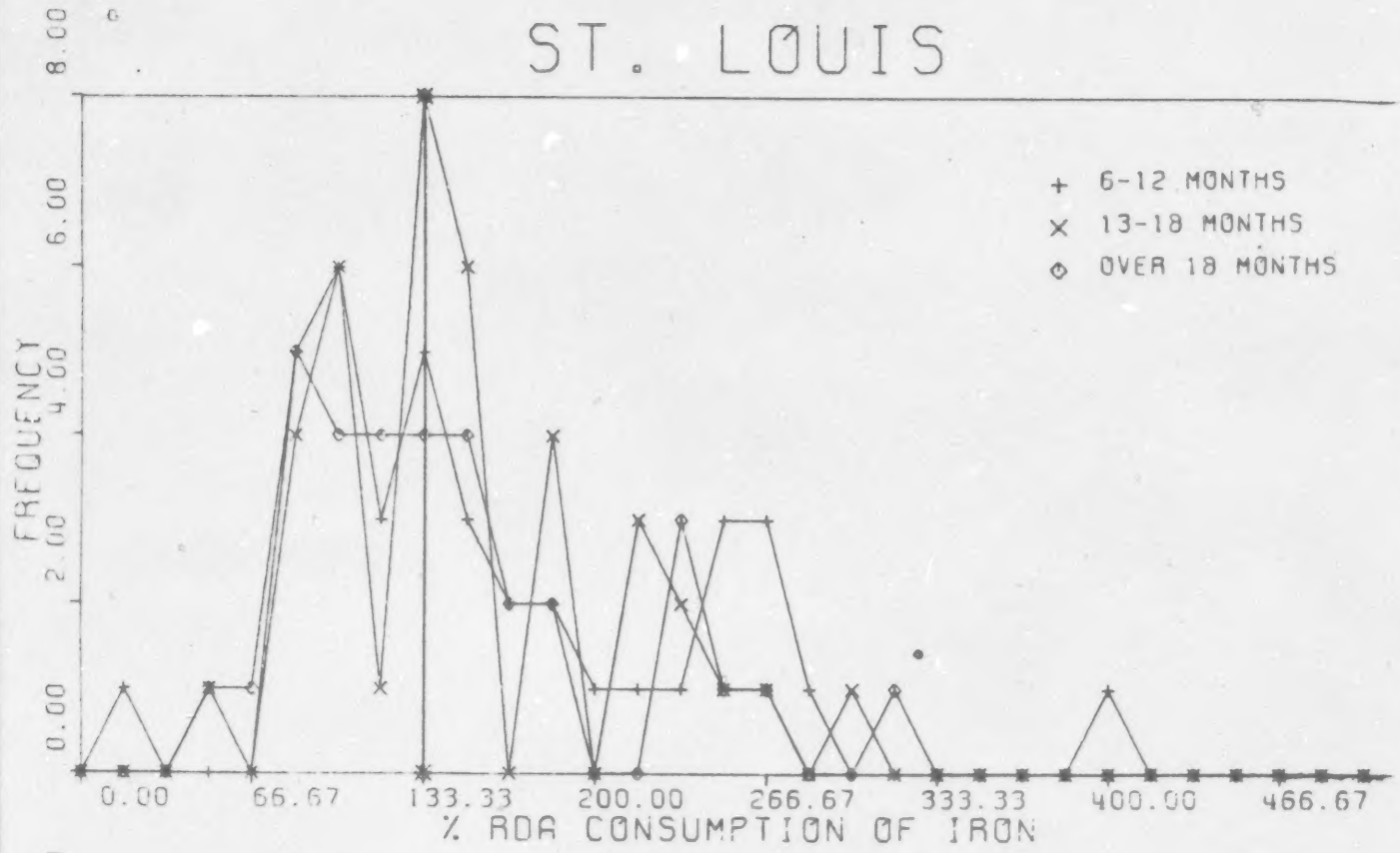
% RDA CONSUMPTION OF VITAMIN A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FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
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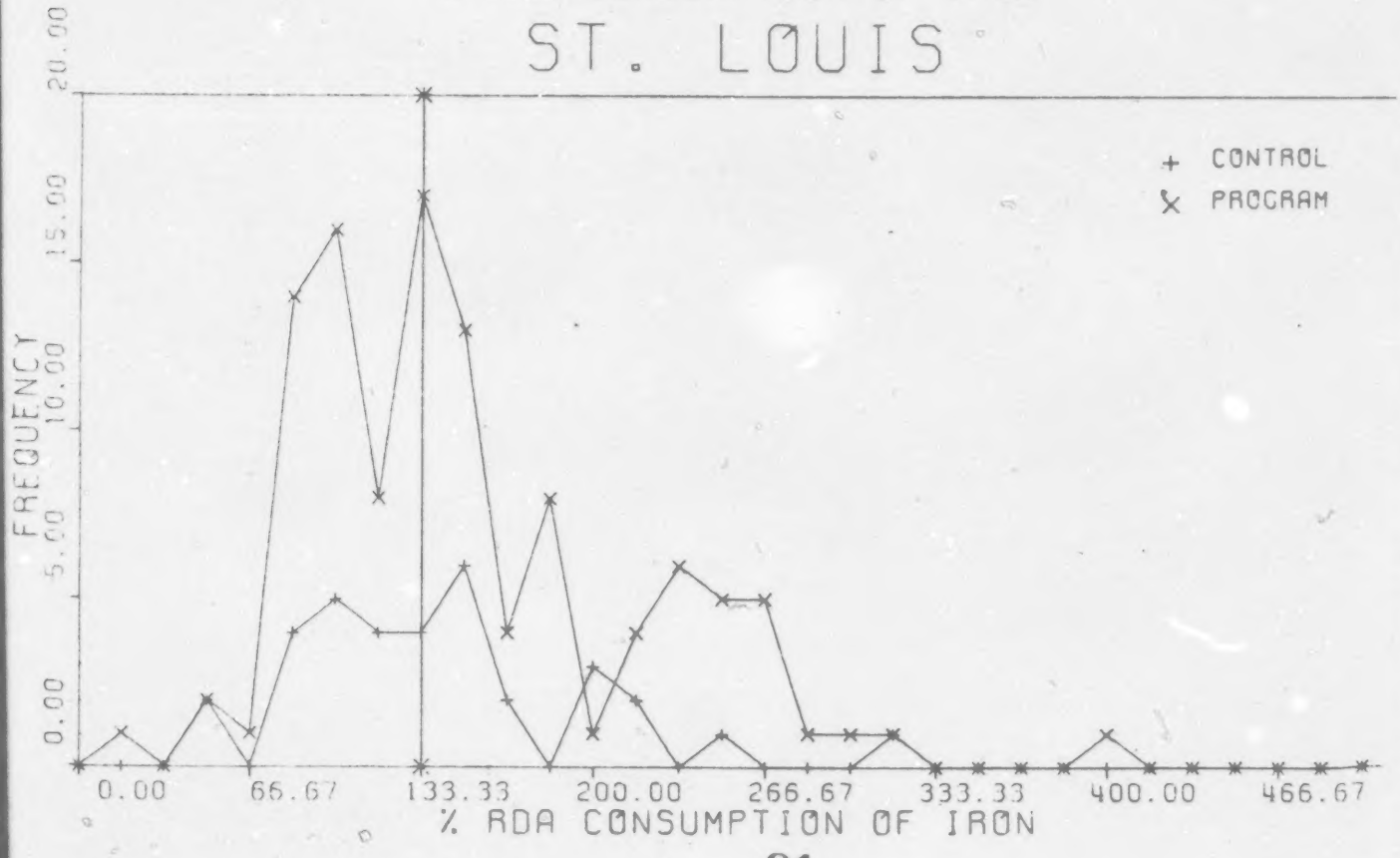
66.67
133.33
200.00
266.67
333.33
400.00
466.67
% RDA CONSUMPTION OF IRON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FREQUENCY
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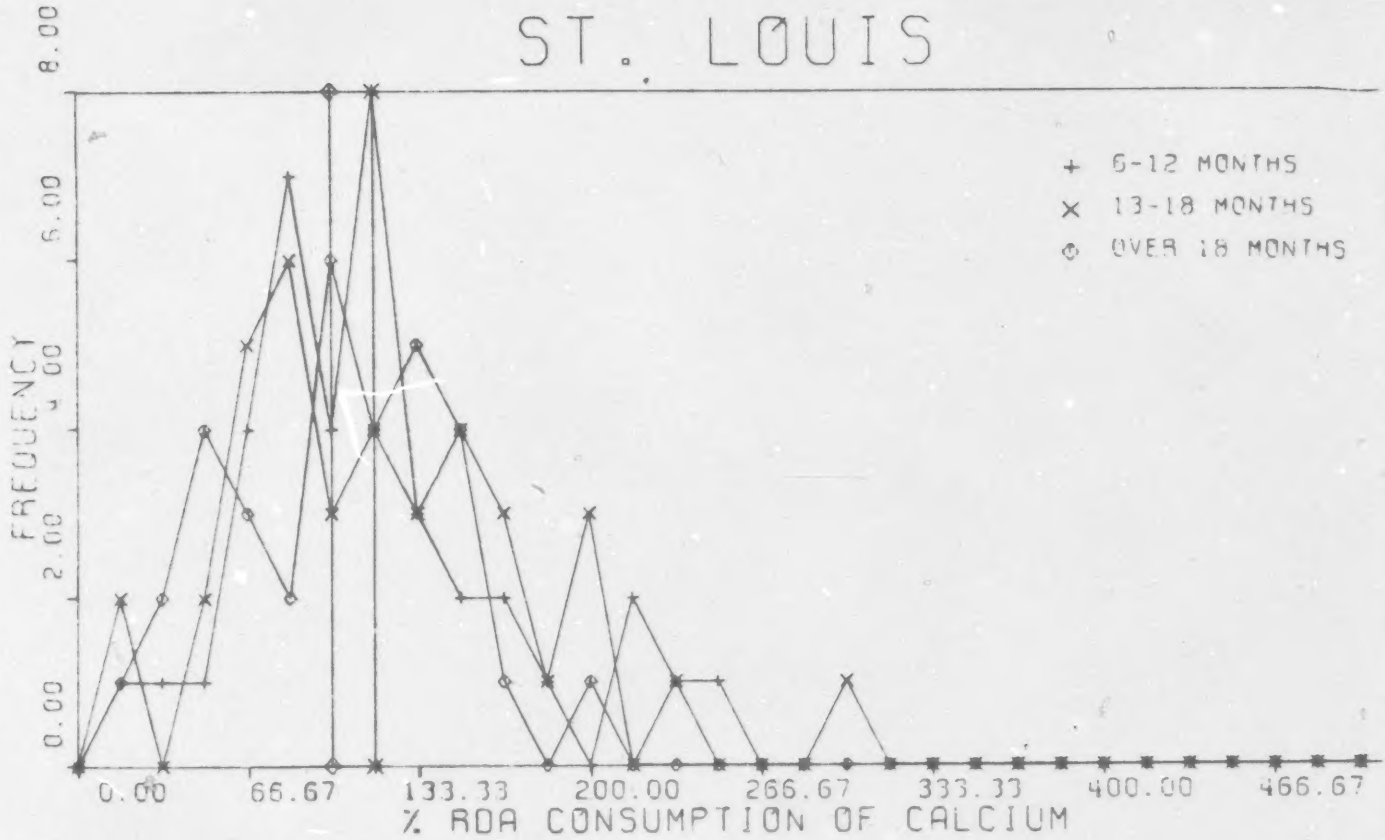
% RDA CONSUMPTION OF IRON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FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
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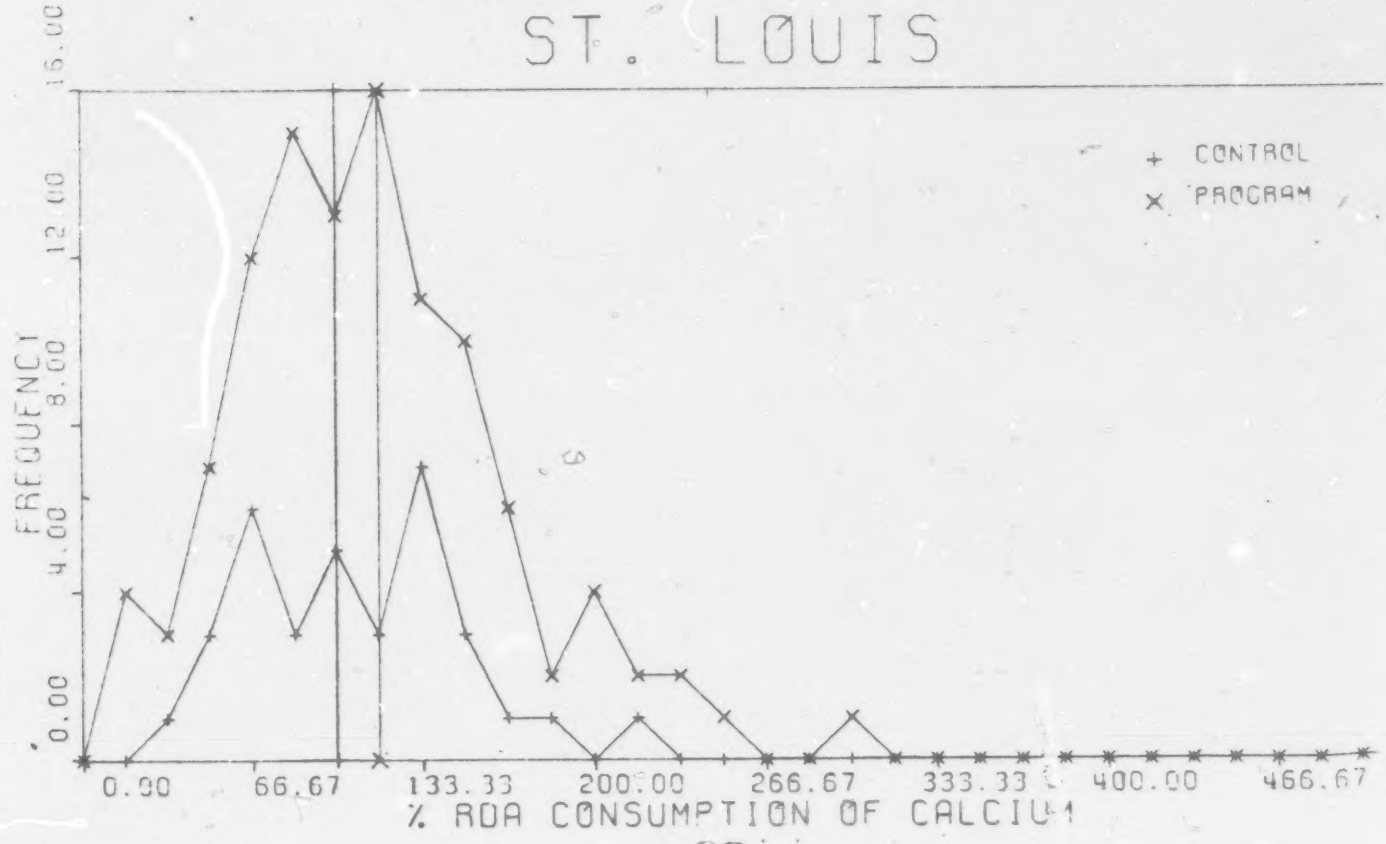
% RDA CONSUMPTION OF CALCIUM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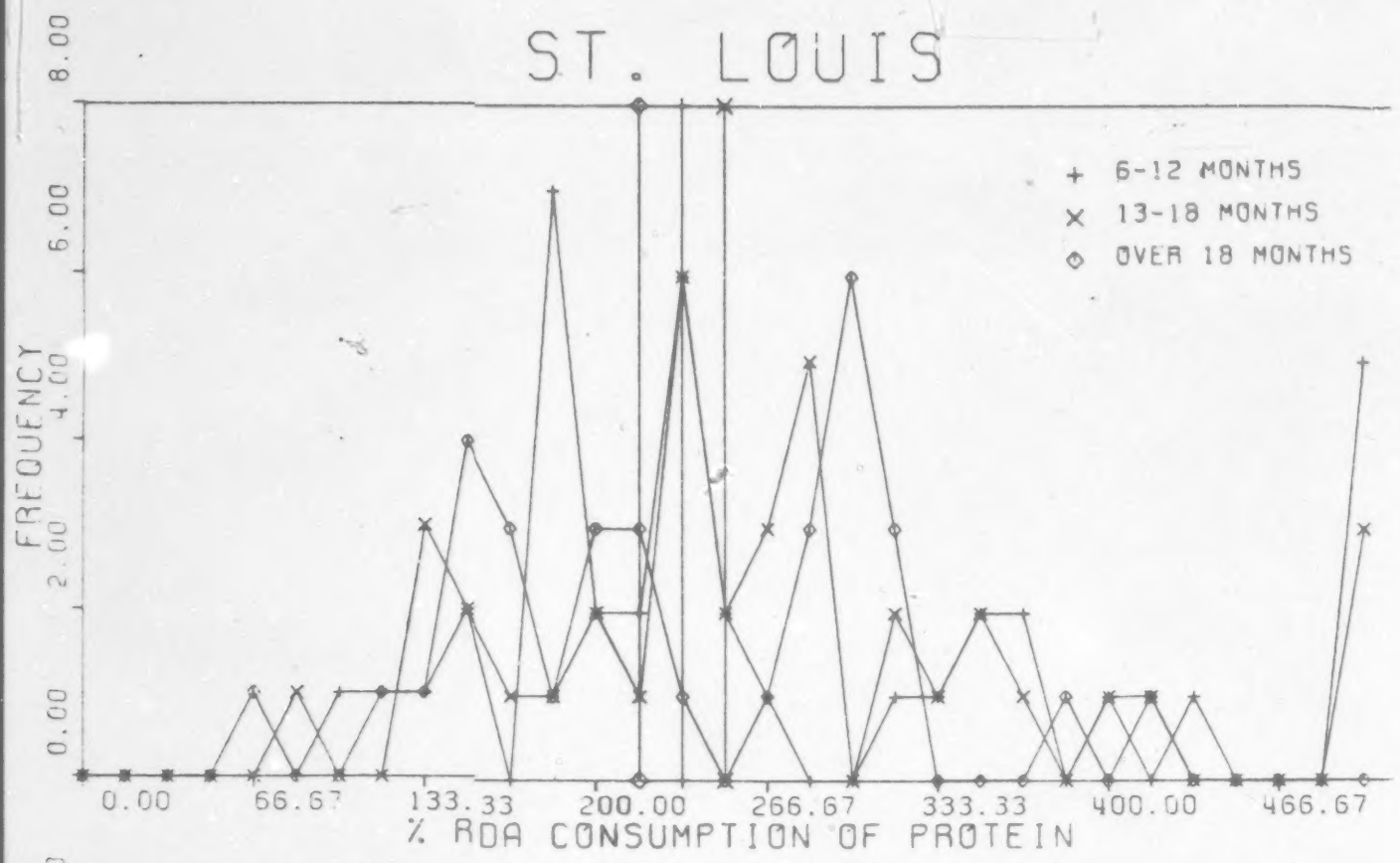
% RDA CONSUMPTION OF CALCIUM


ST. LOUIS
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FREQUENCY
+ 6-12 MONTHS
× 13-18 MONTHS
◇ OVER 18 MONTHS
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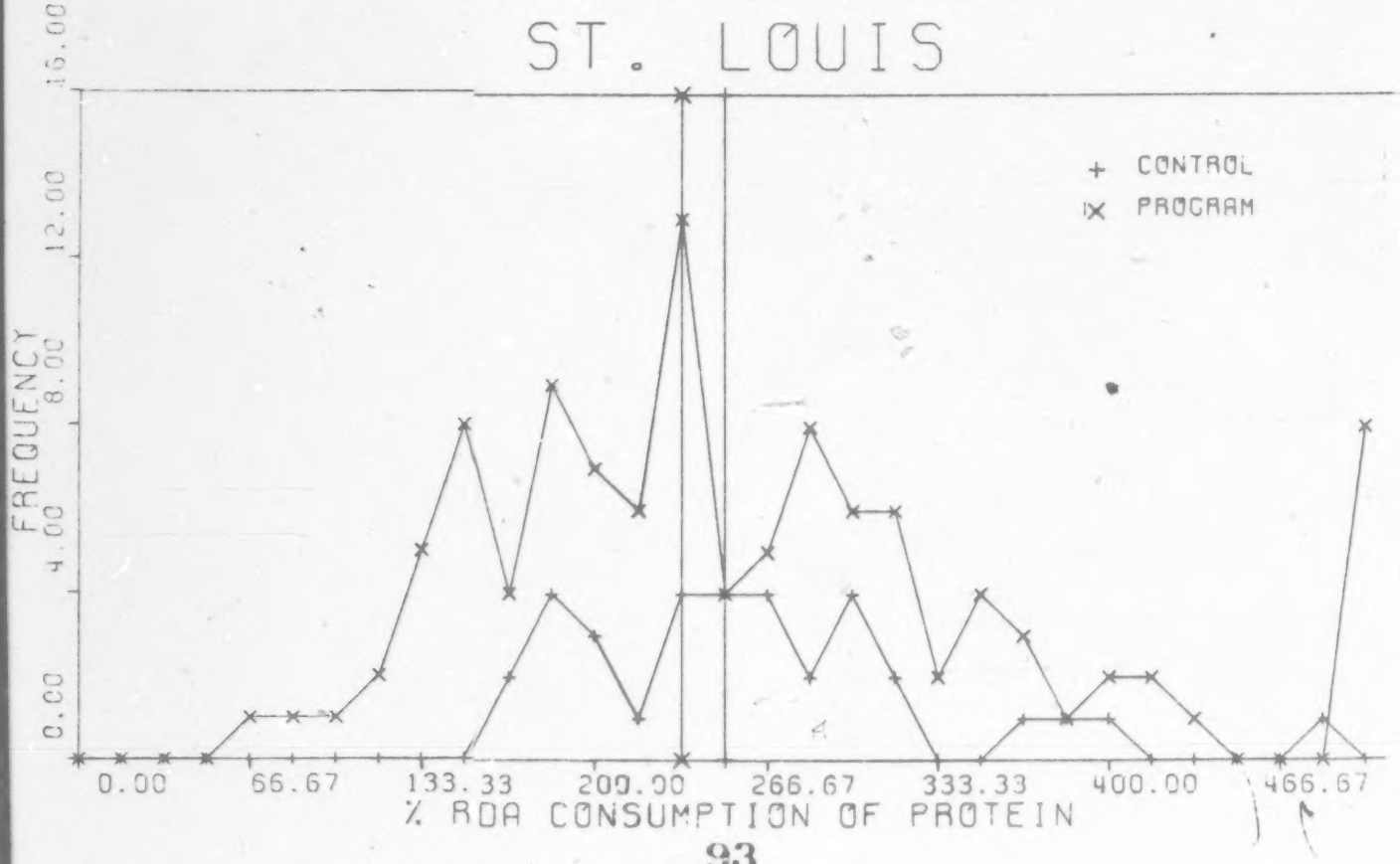
400.00
466.67
% RDA CONSUMPTION OF PROTEIN


ST. LOUIS
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FREQUENCY
+ CONTROL
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466.67
% RDA CONSUMPTION OF PROTEIN

APPENDIX B

Food Buying and Nutrition Knowledge Score By
Frequency of Individual and Group Visit

APPENDIX B

Food Buying and Nutrition Knowledge Score by Frequency of Individual and Group Visits (N in parentheses)

Individual Visit	Group Visit	Inadequate	Adequate
Never	Never	10.500 (2)	10.000 (4)
	Less than monthly	11.200 (5)	10.000 (3)
	Monthly	10.333 (6)	11.500 (6)
	Every other week	6.000 (1)	9.000 (1)
	Weekly	9.167 (12)	10.333 (3)
Less than monthly	Never	9.923 (13)	10.733 (15)
	Less than monthly	9.500 (2)	10.000 (1)
	Monthly	11.000 (1)	------
	Weekly	10.000 (2)	11.500 (2)
Monthly	Never	10.273 (22)	10.588 (17)
	Less than monthly	9.500 (4)	11.000 (2)
	Monthly	11.000 (1)	11.000 (2)
	Weekly	10.000 (2)	------
Every other week	Never	11.333 (3)	12.000 (1)
	Monthly	11.000 (1)	------
	Every other week	10.500 (2)	11.000 (1)
Weekly	Never	10.632 (19)	9.600 (10)
	Monthly	9.000 (1)	11.000 (1)
	Weekly	11.000 (2)	10.000 (1)